

حمل الآن

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المراجعة رقم (1)

الترم الثاني



Question 1:

Choose the correct answer from the following:

Lesson 1:**1. Which of the following most accurately describes the Biosphere?**

- A. The layer of gases surrounding the Earth. B. Living organisms and their habitats on Earth.
C. The water found on the Earth's surface. D. The rocks that form the Earth's crust.

2. The biosphere is considered an "integrated system" because

- A) Every organism in it lives in isolation from the others
B) It is the largest sphere in terms of geological size
C) The survival of organisms depends on complex interactions D) It contains only rocks

3. Which of the following substances is considered from the reactants and products in the photosynthesis process?

- a. Oxygen. b. Water. c. Carbon dioxide. d. Glucose

4. Which of the following processes illustrates the role of the biosphere in influencing the components of the atmosphere?

- A) Plants absorb carbon dioxide to produce food
B) Rocks crumble due to the growth of large tree roots
C) Evaporation of sea and ocean water by solar heat
D) Groundwater flow between porous soil layers.

5. Which of the following relationships demonstrates the integration of Earth's spheres?

- A. The decomposition of dead leaves in the soil by bacteria.
B. The movement of wind above the sea surface only.
C. The evaporation of water from the surface of rocks.
D. The formation of mountains from volcanic lava.

6. Which process represents the only "pathway" for water from the biosphere to the atmosphere according to the plant life cycle?

- A) Respiration. B) Photosynthesis. C) Transpiration. D) Decomposition.

7. A factory disposed of its chemical waste into a river. After a while, scientists noticed the death of all algae in this river, which caused an increase in the percentage of carbon dioxide gas in the air surrounding the area. How do you evaluate this situation in terms of (spheres interaction)?

- A) The imbalance started in the atmosphere then moved to the hydrosphere and lithosphere.
B) Pollution in the hydrosphere disrupted the biosphere's function in purifying the atmosphere.
C) The hydrosphere was affected by waste, but the atmosphere's connection is merely a climatic coincidence.
D) The hydrosphere was affected by waste, but the atmosphere's connection is merely a climatic coincidence.

8. The accumulation of dead organisms' remains over millions of years leads to the formation of fossil fuels (such as coal and oil) within the Earth's crust. This proves that

- A) The biosphere controls the formation of minerals.

- B) The biosphere contributes to the formation of lithosphere resources.
- C) The lithosphere is solely responsible for the decomposition of organisms.
- D) The lithosphere is not affected by living organisms.

9. A farmer noticed that his crop grows better in soil rich in earthworms compared to soil without them. Which of the following statements applies the concept of interaction between the biosphere and lithosphere to explain this?

- A) Worms absorb sunlight and transfer it to plant roots.
- B) Worms release nitrogen gas directly into the atmosphere.
- C) Worms aerate the soil and decompose organic matter within it.
- D) Rocky soil prevents worms from moving, which protects the plant.

10. Scientists search for ancient carbon traces in certain layers of sedimentary rocks to estimate the age of forests that existed in that area. This scientific activity relies on the fact that?

- A) The lithosphere takes carbon from the atmosphere.
- B) The hydrosphere converts living organisms into rocks.
- C) The biosphere is what creates sedimentary rocks.
- D) Remains of the biosphere are preserved and become part of the lithosphere.

11. Which of the following processes represents an interaction that links the biosphere, atmosphere, an lithosphere all at once?

- A) Animals breathing oxygen.
- B) Plants absorbing water, salts, and CO_2 to produce food.
- C) Water evaporation from the ocean surface.
- D) Volcanic eruptions on the ocean floor.

12. In the ecosystem, sunlight represents a/an:

- A. Biotic factor.
- B. Reproductive factor.
- C. Abiotic factor.
- D. Genetic factor.

13. Which of the following organisms represents the "link" that returns matter from the final consumer back to the producer ?

- A) Algae.
- B) Hawk.
- C) Fungi.
- D) Rabbit.

14. What makes a lake is balanced ecosystem, according to you have studied ?

- A) The presence of fish only.
- B) The depth of the water.
- C) Its connection to the atmosphere.
- D) The exchange of matter and energy between biotic and abiotic elements.

15. Which of the following examples illustrates an interaction between Biotic and Abiotic Factors?

- A. A lion preying on a deer.
- B. A plant absorbing sunlight to produce its food.
- C. A fruit decaying due to fungi.
- D. The formation of a community of birds in a forest.

16. Which of the following represents the correct hierarchy from the most specific to the most general?

- A) Ecosystem → Biome → Biosphere.
- B) Ecosystem → Biosphere → Biome.
- C) Biosphere → Ecosystem → Biome.
- D) Biosphere → Biome → Ecosystem.

17. Which of the following is an example of the first level in the hierarchy of life organization on Earth?
- A) A single tree in a forest. B) A herd of antelope in the African savanna.
C) All forms of life on Earth. D) A forest that includes trees, herbaceous plants, insects, and bird.
18. The basic building block of the biosphere in the hierarchy is the
- A) Cell. B) Individual. C) Atom. D) Rock.
19. When individuals of the same species share the same place and time and interact for food, they form a
- A) Integrated ecosystem. B) Biological population. C) Hydrosphere. D) Biological community.
20. A herd of antelope living in the African savanna at a specific time represents the level of a
- A) Individual organism. B) Biome. C) Lithosphere. D) Biological population.
21. A forest containing trees, insects, and birds represents a level of...
- A) Biological population. B) Biological community. C) Individual. D) Biome.
22. Which of the following levels represents a collection of multiple species living and interacting in one area?
- A. Organism. B. Population. C. Community. D. Ecosystem.
23. When several ecosystems share similar climatic characteristics and dominant organisms, they form what is known as a
24. Major deserts that share together in harsh climate characteristics and drought-adaptive plants, are known as.....
- A) Biosphere. B) Bio-environment. C) Biological community. D) Biome.
25. The diversity of organisms in rainforests differs from deserts due to.....
- A) Difference in the type of consumer organisms only. B) Difference in climatic characteristics.
C) The lithosphere is missing in forests. D) Absence of bacteria in deserts.
26. Energy exchange in the biosphere occurs primarily through
- A) Igneous rocks. B) Wind movement only.
C) Food chains and webs. D) Freezing of water at the poles.
27. "Tough fibers" in food are classified as energy.
- A) lost as heat. B) used in movement. C) resulting from respiration. D) stored in waste.
28. Plants are considered Autotrophic Organisms because they:
- A. Consume other organisms to obtain energy.
B. Obtain their food only from salts and minerals.
C. Produce their own food from inorganic substances.
D. Rely on fungi for food decomposition.
29. Which of the following processes represents the conversion of light energy into chemical energy?
- A. Cellular respiration. B. Photosynthesis. C. Organic decomposition. D. Digestion.

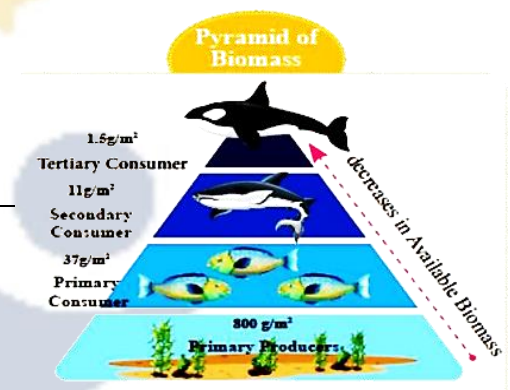
30. Which of the following organisms can perform photosynthesis ?
 A) Fungi. B) Primary consumers. C) Herbivores. D) Some specialized bacteria.
31. Which of the following shows the relationship between trophic patterns and chemical compounds?
 A. Autotrophic organisms make organic compounds that store energy.
 B. Heterotrophic organisms consume salts only.
 C. Decomposer organisms use light to make proteins. D. All organisms use light energy directly.
32. Which of the following is expected to occur in the absence of decomposers from the ecosystem?
 A) Increased rate of energy transfer. B) Increased in the number of top predators.
 C) Faster plant growth. D) Accumulation of organic matter.
33. If the light intensity decreases in an environment, what is the probable effect on energy levels in the ecosystem?
 A. Food productivity increases. B. The amount of glucose produced decreases.
 C. Plant biomass increases. D. No change occurs
34. If we assume a plant produced energy equal to 40,000 J, then the total energy lost by the secondary consumer as heat, energy used in its biological processes, and energy stored in undigested materials equals
- A) 40 J. B) 360 J. C) 400 J. D) 3600 J.

35. In opposite figure: What is the ratio of the mass available to secondary consumers consider to producers?

A) 0.187%. B) 1.37%. C) 4.62%. D) 10%

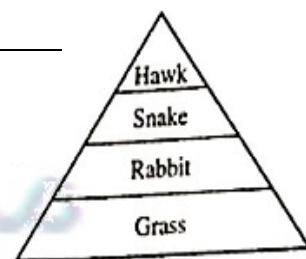
36. All four groups (carbohydrates, proteins, lipids, and nucleic acids) share the characteristic that they are

A) They store genetic information.
 B) They were dissolving easily in water.
 C) They were function as enzymes to regulate vital processes.
 D) They are organic compounds mainly containing carbon and hydrogen.



37. The opposite figure shows the energy pyramid in a balanced ecosystem, if you know that the amount of energy transferred to the snake is 20 J, what is the amount of the lost energy starting from the primary consumer till the tertiary consumer?

A) 2 J. B) 1980 J. C) 2000 J. D) 198 J.



38. The relationship between the number of glucose molecules in disaccharide and polysaccharide and their solubility in water is relationship

A) direct. B) inverse. C) constant . D) not exists.

39. The chemical bond that stores the greatest amount of energy in the ATP molecule is located between

- A) Ribose sugar and the nitrogenous base.
C) The second and third phosphate groups.

- B) The first and second phosphate groups.
D) Carbon and hydrogen in the sugar.

40. "Cellulose is involved in building cell walls, while starch is for storage" Which of the following explains this difference ?

- A) Difference in the elements composing them.
C) Presence of phosphorus in starch.

- B) Difference in biological function.
D) Solubility of cellulose in water.

41. Why does the cell not use glucose energy directly without an intermediate compound (ATP)?

- A) Because glucose is a complex sugar.
C) Because ATP molecules have a simple structure.
D) Because ATP represents a continuous and renewable energy.

- B) Because glucose does not contain energy.

42. "Chitin" in insects and "Cellulose" in plants are similar in the function of

- A) Both are rapid sources of energy.
C) Both dissolve in water.

- B) Both are stored in the liver.
D) Both are involved in forming support structures.

43. The glucose molecule releases its energy in the cell to form:

- A. DNA. B. ADP. C. ATP. D. RNA.

44. The third bond in the (ATP) molecule is characterized by being:

- A. Weak and does not store energy.
C. An ionic bond between two metallic atoms.

- B. Strong and stores energy available for release.
D. A hydrogen bond between two water molecule.

45. If you know that the number of hydrogen atoms in a monosaccharide = X, what is the number of carbon atoms?

- a. $\frac{1}{2} X$. b. $2 X$. c. $3 X$. d. X^2 .

46. A CGM device helps patients by monitoring

- A) Heart rate.
C) Oxygen levels.

- B) Blood sugar levels and carbohydrate availability.
D) Blood viscosity.

47. Adjusting diet pattern based on a CGM device improves

- A) Bone density. B) Stability of energy levels. C) Speed of thinking only. D) Heart rate.

48. When a person has a deep wound, a doctor advises increasing the intake of protein-rich foods. What is the scientific explanation for this?

- A) Because proteins are involved in building body tissues and replacing damaged ones.
B) Because proteins are the primary source of energy.
C) Because proteins store energy for long periods.
D) Because proteins prevent water loss from the wound.

49. Proteins that fight infection are called

- A) Enzymes. B) Immune bodies. C) Keratin. D) Phospholipids.

50. Which of the following does NOT contain nitrogen in its structure?

- A) Immune bodies. B) Enzymes. C) Muscles. D) Plant cell wall.

51. Proteins are distinguished from carbohydrates by the essential presence of the element

- A) Carbon. B) Nitrogen. C) Hydrogen. D) Oxygen.

- 52. Which of the following statements accurately explains the role of proteins?**
 A. They store long-term energy. B. They form cell walls.
 C. They accelerate biological reactions and build tissues. D. They carry genetic information.
-
- 53. "Cholesterol" in the human body is involved in the formation of.....**
 A) Vitamin D. B) Starch. C) Nucleic acids. D) Muscle fibers.
-
- 54. Assuming that the amount of energy obtained by the body when oxidizing 5 grams of sugar equals (X), what is the approximate amount of fat in grams that the body needs to obtain the same amount of energy?**
 a. 2. b. 5. c.10. d.15.
-
- 55. The unit of measurement (kJ/g) is used to express**
 A) The molar mass of chemical compounds.
 B) The energy required to raise the temperature of water. C) The heat capacity of water.
 D) The amount of heat produced by the combustion of one gram of a substance.
-
- 56. The basic unit for measuring caloric content is ...**
 A) kJ/g. B) cal / J. C) kCal/g. D) kcal/J.
-
- 57. If you have 1 Kcal, how much does that equal in Kilojoules?**
 A) 0.418 KJ. B) 41.8 KJ. C) 418 KJ. D) 4.18 KJ.
-
- 58. Which of the following foods would you expect to give the highest ΔT value when one gram of it is burned in a calorimeter?**
 A) A piece of bread. B) A piece of muscle fiber meat.
 C) A drop of olive oil. D) A piece of cucumber.
-
- 59. Which of the following alternatives represents the correct order for the speed of obtaining energy ?**
 A) Starch $\rightarrow$ Fats $\rightarrow$ Glucose. B) Glucose $\rightarrow$ Sucrose $\rightarrow$ Starch.
 C) Cellulose $\rightarrow$ Glucose $\rightarrow$ Fats. D) Glycogen $\rightarrow$ Protein $\rightarrow$ Sucrose.
-
- 60. Why is DNA, and not RNA, responsible for transporting genetic information across generations?**
 A) Because it is smaller in size. B) Due to its double-stranded structure.
 C) Because it exists in the cytoplasm. D) Because it does not contain phosphate.
-
- 61. What might happen if there were no RNA in the cell?**
 A) Protein synthesis will stop despite the presence of DNA.
 B) Proteins will continue to be synthesized normally.
 C) The number of nucleotides in the DNA will increase.
 D) DNA will become capable of producing energy directly.
-
- 62. If we assume that some of the nucleotide components can be used in synthesizing ATP molecules from ADP molecules, how many ATP molecules may be produced from the breakdown of 5 nucleotides?**
 a. 1. b. 2. c.5. d.7.

- 63. CRISPR-Cas9 technology is described as a**
 A) light microscope. B) digestive enzyme. C) diet system. D) high-precision molecular scissor
- 64. The "Genetic Code" results from the difference in**
 A) the sequence of nitrogenous bases. B) the type of sugar only.
 C) the number of phosphate groups. D) the sequence of amino acids.
- 65. A practical application resulting from using the electron microscope to study cell membranes is**
 A) Designing drugs that target specific proteins inside the cell.
 B) Improving the ability of organisms to produce energy.
 C) Increasing the rate of cell division. D) Reducing the need for lipids in membranes
- 66. Advances in electron microscopy technology have helped in**
 A) converting sugar into fats. B) increasing body weight.
 C) understanding how molecules are arranged inside the cell. D) cooling the cell.
- 67. The higher plants are able to transfer water over long distances, despite the absence of a specialized organ, because.....**
 a) they depend on gravity to push water
 b) Specialized transport systems and physical mechanisms are present
 c) Each plant cell absorbs water that is directly needed from the environment
 d) Roots push water effectively to other parts
- 68. If the leaves of a pine tree are coated with a waxy substance that blocks the stomata, the first process to stop will be.....**
 A) Lignin production B) Upward movement of water to the leaves
 C) Water flow in the phloem D) Food storage
- 69. The Cohesion-Adhesion theory depends primarily on the properties of ...**
 A) Water molecules B) Food molecules C) Oxygen D) Carbon dioxide
- 70. Damage to the phloem in a tree leads to**
 A) Roots drying out due to lack of water B) Death of roots due to lack of food supply
 C) Increased salt absorption D) Stopping of transpiration
- 71. The primary function of xylem tissue in plants is to transport**
 A) Products of photosynthesis B) Oxygen C) Water and minerals D) Energy
- 72. The appearance of air bubbles inside xylem vessels causes**
 A) Increased transpiration rate B) Increased speed of water ascent
 C) Salt accumulation in leaves D) Obstruction of the water column movement upwards
- 73. During summer ,why does the process of transpiration become more important for the plant?**
 A) Because it helps cool the leaves B) Because it increases sugar storage
 C) Because it reduces salt absorption D) Because it stops photosynthesis

Lesson 2:

- 74. Storing sugars in roots during winter and transporting them to leaves in spring proves that transport in the phloem**
 A) Depends on gravity
 B) Occurs in two directions (bidirectional)
 C) Occurs from bottom to top only
 D) Stops in extreme cold
-
- 75. Which of the following agricultural applications benefits most from Micro-CT results?**
 A) Improving protein productivity
 B) Increasing cellular respiration rate
 C) Developing drought resistance strategies
 D) Enhancing chlorophyll formation
-
- 76. Modern technologies, such as Micro-CT Scanning (Micro-X-ray Computed Tomography), are used to.....**
 A) Accurately image water and food transport mechanisms
 B) Kill pests
 C) Increase growth rate
 D) Stimulate respiration
-
- 77. The system responsible for transporting oxygen and nutrients in the human body is the**
 A) Respiratory system
 B) Circulatory system
 C) Excretory system
 D) Digestive system
-
- 78. In the human circulatory system, digested nutrients are transported to the cells via the:**
 A) Capillaries
 B) Arteries
 C) Veins
 D) Heart
-
- 79. Blood viscosity, as a physical property, mainly depends on**
 A) affects the effort required to pump the blood
 B) Concentration of protein and red blood cells
 C) Oxygen percentage
 D) Adhesion force
-
- 80. The pulmonary circulation begins with**
 A) Oxygenated blood from the left ventricle
 B) Deoxygenated blood from the right ventricle
 C) Deoxygenated blood from the left ventricle
 D) Oxygenated blood from the right ventricle
-
- 81. In which blood vessels does the actual gas exchange occur?**
 A) Aorta
 B) Pulmonary artery
 C) Pulmonary veins
 D) Blood capillaries
-
- 82. Which of the following statements explains the relationship between transport in plants and transport in humans?**
 A) Both occur in only one direction
 B) Both aim to distribute materials and energy within the body
 C) Both rely on lignin
 D) Both rely on the process of transpiration
-
- 83. A decrease in blood density leads to**
 A) Increased blood pressure
 B) Cardiac stopped
 C) Decreased effort required to pump blood
 D) Oxygen accumulation
-
- 84. Which of the following factors leads to an "increase" in arterial blood pressure?**
 A) Increased resistance of arterial walls
 B) widening of blood vessels
 C) Decrease in blood volume
 D) Slow heart rate
-
- 85. Blood pressure in the arteries is at its highest level during**
 A) Ventricular diastole (relaxation)
 B) Sleep
 C) When blood reaches the veins
 D) Ventricular systole (contraction)

- 86. The renal denervation technique is a physical application used to treat**
 A) Shortness of breath
 B) Diabetes mellitus
 C) Visual weakness
 D) High blood pressure
-
- 87. The relationship between the processes of respiration and photosynthesis is that:**
 a) The products of respiration are reactants for photosynthesis
 b) Both occur in the mitochondria
 c) Both require sunlight
 d) Both occur in all organisms
-
- 88. Which of the following is an example of active transport in a cell?**
 A) Oxygen passing across the membrane
 B) Water moving by osmosis
 C) Transport of ions against their concentration gradient in root cells
 D) Diffusion of gases from the lungs into the blood
-
- 89. Aerobic cellular respiration in cells produces:**
 A) Carbon dioxide, water, and energy
 B) Alcohol and energy
 C) Lactic acid only
 D) Energy without other products
-
- 90. If a substance is innovated to increase the efficiency of oxygen transport to the mitochondria, it is expected to**
 A) Increase lactic acid fermentation
 B) Aerobic respiration switches to anaerobic respiration
 C) Increase the efficient in energy production
 D) Stop ATP production
-
- 91. Anaerobic respiration in human muscles during strenuous exercise results in the accumulation of**
 A) Ethyl alcohol
 B) Glucose
 C) Glycogen
 D) Lactic acid
-
- 92. Anaerobic fermentation in yeast cells produces**
 A) Oxygen
 B) Water only
 C) Lactic acid
 D) Ethanol
-
- 93. Which of the following is considered an exothermic reaction?**
 A) Glucose synthesis in photosynthesis
 B) Glucose breakdown in aerobic respiration
 C) Formation of ATP from ADP
 D) All of the above
-
- 94. Which of the following processes is responsible for converting potential energy in food into active energy?**
 A) Transport
 B) Respiration
 C) Excretion
 D) Photosynthesis
-
- 95. Anaerobic respiration occurs within the cell inside the.....**
 A) Cytoplasm
 B) Mitochondria
 C) Nucleus
 D) Sap vacuole
-
- 96. The accumulation of lactic acid in muscles leads to**
 A) Products of photosynthesis
 B) Feeling of muscle fatigue(tired)
 C) decreases in water and minerals
 D) Increased muscle activity
-
- 97. Why is aerobic respiration considered more efficient than anaerobic respiration?**
 A) Because it produces CO_2
 B) Because it occurs only in the cytoplasm
 C) Because it produces a larger amount of energy (ATP)
 D) Because it does not require enzymes

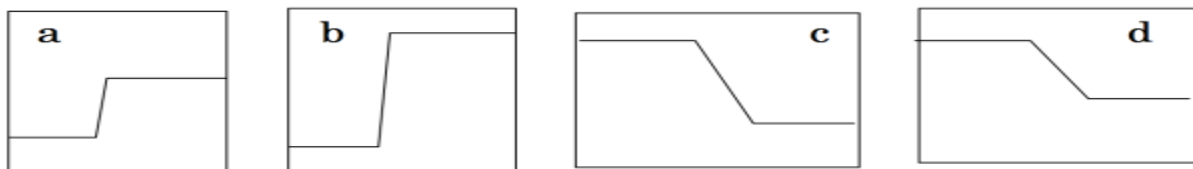
98. If the enthalpy of the reactants is 2584 kJ and that of the products is 5642 kJ, then this reaction is

- a- Exothermic, with ΔH negative b- Endothermic, with ΔH negative
c- Exothermic, with ΔH positive d- Endothermic, with ΔH positive

99. From the equation: $2C_{(s)} + 2H_{2(g)} + 52.3 \text{ kJ} \rightarrow C_2H_{4(g)}$, It can be concluded that....

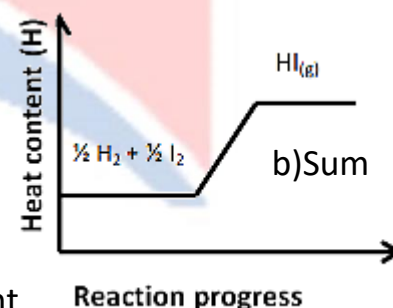
- a- the medium acquires heat. b- heat transfers from the surrounding medium to the system.
c- the system loses heat. d- heat transfers from the system to the surrounding medium

100. Which graph represented a reaction produces largest amount of energy (heat) to the surrounding medium?



101. Which of the following best describe the heat change of this reaction?

- a) Sum of heat content of products (H_p) is greater than of sum of heat content of reactants (H_R) and sign of ΔH is positive.
b) Sum of heat content of products (H_p) is less than of sum of heat content of reactants (H_R) and sign of ΔH is positive.
c) Sum of heat content of products (H_p) is less than of sum of heat content of reactants (H_R) and sign of ΔH is negative.
d) Sum of heat content of products (H_p) is greater than of sum of heat content of reactants (H_R) and sign of ΔH is negative.



102. From the following equation: $H_2O_{(l)} \rightleftharpoons H_2O_{(g)}$, $\Delta H = +44 \text{ kJ/mol}$,

- a) heat content of water vapour > heat content of liquid water
b) heat content of water vapour = half heat content of liquid water
c) heat content of water vapour < heat content of liquid water
d) heat content of water vapour = heat content of liquid water

103. The following equation represents the dissociation reaction (electrolysis) of water:

$2H_2O \rightarrow 2H_{2(g)} + O_{2(g)}$, $\Delta H = +571.8 \text{ kJ}$. From this equation, it is clear that the process of forming a mole of water from its primary elements under standard conditions is an.....

- a) exothermic process which releases an amount of heat equal to 571.8 kJ/mol
b) exothermic process which releases an amount of heat equal to 285.9 kJ/mol
c) endothermic process which absorbs an amount of heat equal to 571.8 kJ/mol
d) endothermic process which absorbs an amount of heat equal to 285.9 kJ/mol

104. If ΔH for the reaction = + 200 kJ, then...

- a) The system releases heat b) The surrounding medium gain heat
c) The system gains heat d) ΔH is negative

105. Why must a chemical equation be balanced when calculating enthalpy change ?

- a- To achieve the law of conservation of energy.
- b- To achieve the law of conservation of mass
- c- To keep the temperature constant
- d- To determine the type of reaction (endothermic/exothermic).

106. In an exothermic reaction

- a- The energy stored in the products is less than the energy stored in the reactants.
- b- The energy stored in the reactants is less than the energy stored in the products.
- c- The surrounding medium lose heat
- d- The system gains heat.

107. Which of the following equations represents an exothermic reaction ?

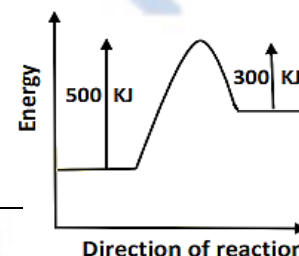
- a- $XY_5 \rightarrow XY_3 + Y_2$, $\Delta H = +420 \text{ KJ}$
- b- $XY_5 \rightarrow XY_3 + Y_2 + 420 \text{ KJ}$
- c- $XY_5 \rightarrow XY_3 + Y_2 - 420 \text{ KJ}$
- d- $XY_5 + 420 \text{ KJ} \rightarrow XY_3 + Y_2$

108. Equal amounts of four different substances (A, B, C & D) were added separately to equal amounts of an acid and a thermometer placed in each mixture. For which mixture is the reaction the most exothermic?

- A. mixture (A) temperature rises by 3°C
- B. mixture (B) temperature rises by 5°C
- C. mixture (C) temperature falls by 3°C
- D. mixture (D) temperature falls by 5°C

109. From the opposite diagram of energy , the value of $\Delta H = \dots$

- A) + 200 KJ
- B) - 200 KJ
- C) + 300 KJ
- D) - 300 KJ



110. Which process is considered an exothermic system:

- A-freezing
- b-evaporation
- c-melting
- d-heating water

111. Which of the following biological processes represents an example of an endothermic (energy-absorbing) reaction?

- a- Cellular respiration
- b- Formation of water molecules
- c- Decomposition of potassium chloride
- d- Photosynthesis

112. Which of the following biological processes represents an example of an endothermic (energy-absorbing) reaction?

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- c- Decomposition of potassium chloride
- d- Photosynthesis

113. The mass of one mole of water equal.....

114. Heat content of water is the sum amount of stored energy in(H = 1 , O = 16)

- A- 1 L
- B- 18 g
- C- 22.4 L
- D- 1 Kg

115. The number of moles in 180 g of acetic acid (CH_3COOH) = ... (C = 12 , H = 1 , O = 16)

- A- 1 mol
- B- 2 mol
- C- 3 mol
- D- 4 mol

116. In the reaction: $2\text{H}_2\text{O}_2 (\text{e}) \rightarrow 2\text{H}_2\text{O}(\text{e}) + \text{O}_2 (\text{g})$, $\Delta H = -196 \text{ kJ/mol}$, what is the change in heat of the decomposition of 0.34 g of hydrogen peroxide H_2O_2 (H = 1 , O = 16) ?

- a- - 0.98 kJ
- b- - 1.96 kJ
- c- - 196 kJ
- d- - 98 KJ

117. using the chemical equation: $\text{H}_2\text{O}_{(v)} \rightarrow \text{H}_2\text{O}_{(l)}$, $\Delta H = -44 \text{ K.J}$ Then heat change (ΔH) for condensation 2 mole of water =.....K.J

- a) -88 K.J b) +88 K.J c) -44 K.J d) + 44 K.J

118. From the combustion equation of the hydrocarbon $\text{C}_2\text{H}_4 + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 2\text{H}_2\text{O} + 955 \text{ kJ}$ (C = 12 , H = 1) If 84 grams of the hydrocarbon are completely burned, then

- a) The surrounding medium gains 955 KJ of energy
b) The surrounding medium loses 2865 KJ of energy
c) The reactants lost 2865 KJ of energy d) The surrounding medium gains 1910 KJ of energy

119. By using the following equation of burning of octane : $2\text{C}_8\text{H}_{18(l)} + 25\text{O}_{2(g)} \rightarrow 16\text{CO}_{2(g)} + 18\text{H}_2\text{O}_{(g)} + 10900 \text{ KJ}$ Then the change in (ΔH) enthalpy when 4 moles are resulted from CO_2 equal ...

- A- -5450 KJ B- +5450 KJ C- +2725 KJ D- -2725 KJ

120. If the heat enthalpy of reactant (HR) is 1250 KJ and enthalpy of product (HP) 1720 KJ then

- A- The reaction is endothermic , $\Delta H = +470 \text{ KJ}$ B- The reaction is exothermic , $\Delta H = -470 \text{ KJ}$
C- The reaction is exothermic, $\Delta H = +470 \text{ KJ}$ D- The reaction is endothermic, $\Delta H = -470 \text{ KJ}$

121. In the cellular respiration experiment using seeds, it was observed that the limewater in flask (A) (at room temperature) turned cloudy faster than in flask (B) (in the refrigerator). How can this difference be analyzed?

- A. The rate of oxygen production is higher in flask (A).
B. The rate of carbon dioxide consumption is higher in flask (B) .
C. The rate of cellular respiration (CO_2 production) is higher in flask (A)
D. The seeds in flask (B) died due to extreme cold

Lesson 3:

122. Body toxicity increases when:

- A) The respiration rate decreases B) Metabolic waste accumulates
C) Sweat secretion increases D) Blood pressure decreases

123. Which of the following illustrates the dual nature of metabolism?

- A) Muscle contraction and relaxation B) Inhalation and exhalation
C) Nerve impulse transmission D) Protein synthesis and glucose breakdown

124. Which of the following shows the importance of excretion in homeostasis?

- A) Preventing accumulation of harmful by-products B) Maintaining stable blood glucose levels
C) Ensuring oxygen delivery to tissues D) Regulating nerve impulse speed

125. The accumulation of metabolic wastes directly leads to.....

- a) Increase rate of catabolism b) Decrease in temperature
c) Increase efficiency of cells d) Disturbance of the chemical balance of fluids

126. Metabolism is a process of

- a) Catabolism only b) Anabolism only c) Both catabolism and anabolism d) Excretion only

127. The relationship between "catabolism" and metabolic waste products is

- a) Direct; increased catabolism increases waste products
- b) Inverse; catabolism reduces waste products
- c) constant; unaffected by activity
- d) Metabolic waste products are limited to the products of anabolism only

128. Which of the following organs is considered the primary organ responsible for removing nitrogenous waste from the blood?

- A) The Liver B) The Skin C) The Kidneys D) The Lungs

129. When the salts in the blood increase, the kidneys respond by:

- A) Secreting more Sweat B) Increasing the reabsorption of water
C) Increasing the excretion of water D) Storing salts

130. If the kidneys fail to perform their function, the first thing to be affected is:

- A) Oxygen level B) The percentage of waste in the blood
C) The number of blood cells D) Hormone production

131. What is the main function of reabsorption in the kidneys ?

- A) Removing wastes from the blood B) Recovering useful substances such as glucose
C) Storing urine D) Converting ammonia into urea

132. Urine moves from the kidney to the bladder through

- A) Ureters B) Urethra C) Nephron D) Blood vessels

133. When there is a disturbance in ion concentration inside the body, delicate vital processes such as are affected

- A) Hair growth B) Nerve and muscle function C) Skin color D) Liver size

134. Which of the following organ contribute to regulating both body temperature and salts?

- a) Salivary glands b) Endocrine glands c) liver d) Skin

135. The layer that contains sweat glands and hair follicles is

- A) Dermis B) Epidermis C) Hypodermis D) Outer membrane

136. When examining a urine sample from a patient, it was found to contain large amounts of glucose. This may indicate a defect in the process of

- a) Filtration b) Storage of urine c) Reabsorption d) Excretion

a) Rate of breathing
b) Kidneys activity
c) Production of skin pigment
d) Breakdown of hemoglobin

	Decreasing the lost amount of water from	Increasing the lost amount of water from
(a)	Skin	Kidneys
(b)	Kidneys	Lungs
(c)	Kidneys	Skin
(d)	Skin	Lungs

A) raise body temperature B) increase blood viscosity
C) absorb oxygen D) decrease body temperature

A) Epidermis B) Dermis C) Hypodermis D) Blood capillaries

A) the amount of proteins consumed
B) Kidney size
C) decrease in breathing rate
D) increase in surrounding temperature

a) A barrier against microbes
b) A filter for blood
c) A thermal insulator due to its fat content
d) A producer of sweat

a) Ammonia b) Urea c) Uric acid d) Bilirubin

a) sweat b) urine c) feces d) exhaled air

a) Starch b) Amino acids c) Fats d) Glucose

- 146.** The accumulation of bilirubin in the body leads to
a) Jaundice b) Bile c) Asthma d) Dehydration
-
- 147.** Which excretory organ would be most affected when consuming foods containing dyes?
a) Lungs b) Liver c) Bladder d) Skin
-
- 148.** The relationship between the liver and kidney in dealing with proteins is ...
A) The kidney breaks down proteins and the liver expels them
B) The liver converts ammonia into urea and the kidney excretes it
C) Both absorb proteins D) No relationship
-
- 149.** Bile helps in the disposal of
A) Glucose B) Oxygen C) Excess cholesterol D) Urea
-
- 150.** Ammonia in the liver is converted into
A) Bilirubin B) Glucose C) Urea D) Uric acid
-
- 151.** Increased blood acidity caused by CO₂ negatively affects ...
A) Enzyme activity B) Bones C) Skin D) Hair
-
- 152.** which of the following metabolic waste it's accumulation increases blood acidity?
a) Carbon dioxide b) Mineral salt c) Urea d) Ammonia
-
- 153.** What is the common role between the skin and the kidneys in Homeostasis?
A) Hormone production B) Waste storage
C) Excretion of water and salts D) Energy production
-
- 154.** Artificial kidney membranes prevent proteins from passing because of?
A) their electrical charge B) the large size of their molecules
C) their high speed D) the viscosity of the cleaning fluid
-
- 155.** Thermal radiation can be measured by...
a) ultraviolet rays b) Sound waves c) Infrared rays d) Ultrasound waves
-
- 156.** The bioartificial kidney differs from traditional dialysis machines in its ability to
A) remove excess water B) eliminate urea
C) simulate biochemical functions D) cool the blood
-
- 157.** The process that "pulls" carbon from the atmosphere is
a) respiration b) combustion c) photosynthesis d) decomposition

158. Using Infrared Thermography to measure skin temperature is a measurement of

- A) nuclear energy
- B) soil nitrates
- C) energy lost in the process of thermal balance
- D) sound waves

159. The property that helps reveal the texture of an organ is

- A) wave scattering
- B) regular reflection
- C) constant sound speed
- D) tissue viscosity

160. The diagnosis that does not require surgery thanks to Ultrasound is ...

- A) kidney transplantation
- B) heart valve replacement ?
- C) cell engineering
- D) detection of stones and inflammations

161. The boundaries in Ultrasound mean the transition from

- A) liquid to gas only
- B) carbon to phosphorus
- C) bacteria to nitrates
- D) one medium with acoustic impedance to another medium

162. Ultrasound devices used for imaging organs rely on sound properties such as

- a) evaporation and transpiration
- b) weathering and deposition
- c) fixation and denitrification
- d) reflection and refraction

163. Ultrasound waves of high frequency are specifically used because they

- a) kill bacteria
- b) heat tissues
- c) provide high resolution for imaging small details
- d) travel faster than light

164. The strength of ultrasound wave reflection depends on

- a) the acoustic impedance of the tissue
- b) the color of the organ
- c) its temperature
- d) the amount of urea in the blood

165. The role of factories in the carbon cycle is

- a) absorbing carbon
- b) releasing carbon oxides
- c) fixing nitrogen
- d) recycling proteins

166. Carbon moves from plants to animals through

- a) respiration
- b) evaporation
- c) decomposition
- d) feeding

167. Carbon returns to the atmosphere from living organisms through two processes ...

- A) photosynthesis and transpiration
- B) weathering and deposition
- C) respiration and decomposition
- D) fixation and denitrification

168. Lightning contributes to

- A) decomposition
- B) fixation of atmospheric nitrogen
- C) respiration
- D) phosphate deposition

169. Increasing the amount of urea in soil leads to

- A) increased nitrates available to plants
- B) decreased rate of photosynthesis
- C) accumulation of carbon dioxide in the atmosphere
- D) stoppage of the carbon cycle

170. Which of the following reflects a disruption in the nitrogen cycle due to human activity?

- A) planting diverse crops
- B) crop rotation
- C) excessive use of chemical fertilizers
- D) presence of nitrifying bacteria in soil

171. Farmers rely on planting legumes to improve soil fertility because they ...

- a) consume small amounts of nitrogen
- b) produce more proteins than other plants
- c) prevent nitrification
- d) contain bacteria that fix nitrogen in their roots

172. During the nitrogen cycle in nature, which of the following living organisms act on fixing the atmospheric nitrogen?

- a) Green plants.
- b) Mushroom fungus.
- C) Nodular bacteria.
- D) Herbivores

173. The decomposition of urea in soil by bacteria produces

- a) ammonia and then nitrates absorbed by plants
- b) oxygen gas
- c) rock phosphates
- d) sound echoes

174. Eliminating nitrogen-fixing bacteria in the soil leads to

- a) increased protein production in plants
- b) increased rate of cellular respiration
- c) accumulation of nitrogen gas in the atmosphere
- d) decreased soil fertility

175. The process that releases phosphorus from rocks is called

- a) Respiration
- b) Evaporation
- c) Weathering
- d) Nitrification

176. The phosphorus cycle differs from the carbon and nitrogen cycles in that

- a) the atmosphere is not part of it
- b) it does not require decomposers
- c) it is very fast
- d) it occurs in outer space

177. Excretion is not merely the elimination of toxins, but rather

- A) a means of gaining weight
- B) a purely physical process
- C) a source of solar energy
- D) an important link in the continuation of element cycles

178. Without decomposer organisms, the element cycles

- A) stop
- B) accelerate
- C) become gaseous only
- D) depend on the artificial kidney

179. Excretion processes and natural cycles together ensure

- A) depletion of resources
- B) the survival and sustainability of life in the biosphere
- C) the cessation of sound waves
- D) the freezing of the Earth

180. Which of the following reflects the importance of excretion in ecological balance?

- a) Accumulation of wastes without decomposition b) Cessation of carbon dioxide excretion
c) Decomposition of urea into ammonia in the soil d) Absence of decomposer bacteria.

181. The basic structural units of the nervous system are called :

- A) Neurons B) Peripheral nerves C) Nephrons D) Cerebral lobes

Lesson 4:

182. The basic "receptive unit" in the complex neural network is :

- a) Dendrites b) Axon c) Nerve endings d) Synaptic cleft

183. What is the function of dendrites in a neuron?

- a) Communicating with muscles and glands to give commands.
b) Containing the nucleus and essential organelles of the cell.
c) Receiving nerve signals from other cells.
d) Transmitting the nerve signal away from the cell body

184. The peripheral nervous system includes.....

- a) sensory neurons and brain. B) spinal cord and motor neurons
c) all nerves throughout the body. D) brain and spinal cord

185. The nerve cell is considered the fundamental unit in the formation of the nervous system, and its basic function is:

- A) Hormone production B) Nerve impulse transmission C) Energy storage D) Body defense

186. Which of the following statements explains why the Sodium-Potassium pump requires energy?

- A) Because it moves ions down the concentration gradient
B) Because it moves ions against the concentration gradient
C) Because it does not depend on ATP D) Because it only works during sleep

187. During depolarization, the membrane potential:

- A) Stays constant at -70 mV B) Becomes more negative
C) Changes from negative to positive D) Does not change

188. The "Repolarization" phase shows the outer surface returning to a positive state due to :

- a) Stopping Sodium input and opening Potassium channels for output
b) More Sodium input
c) Rupture of Synaptic vesicles d) Movement of the nucleus within the cell body

189. During depolarization, charges are reversed because :

- a) Negative proteins move exit the cell b) The nucleus stops its activity
c) The Sodium pump stops working completely d) positive Na^+ move in exceeds move out K^+

190. During the refractory period, Sodium channels are:

- A) Unable to respond to a new stimulus B) Completely open
C) Pumping Potassium D) Disappeared

191. The potential difference reaching (+40 mV) means that :

- A) The cell lost its ability to sense B) Sodium ions have flowed inward in large quantities
C) The enzyme that breaks down acetylcholine has started working
D) The cell is in a state of complete rest

192. Which of the following represents the state of polarization?

- A) High permeability of Sodium into the cell B) Opening of Calcium channels
C) Accumulation of positive charges outside the membrane and negative charges inside
D) Constriction of synaptic vesicles

193. What is the correct ratio of ion exchange across the Sodium-Potassium pump per ATP molecule?

- A) 3 Sodium ions out versus 2 Potassium ions in B) 2 Sodium ions out versus 3 Potassium ions in
C) 1 Sodium ion out versus 1 Potassium ion in D) 3 Potassium ions out versus 2 Sodium ions in

194. Which of the following choices in the table represents the correct numbers of sodium and potassium ions exchanged through the sodium-potassium pump and the number of ATP molecules required for this exchange?

	The number of sodium ions that exit from the cell	The number of potassium ions that enter the cell	The number of ATP molecules consumed
a	22	66	42
b	44	22	66
c	66	44	22
d	44	66	22

195. The nerve impulse travels along the axon through :

- A) Continuous electrical flow

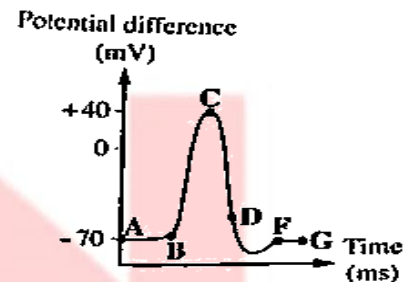
- B) A successive series of depolarization and repolarization processes
 C) Movement of vesicles inside the axon D) Vibration of the sheath surrounding the axon

196. During repolarization, what happens?

- A) Sodium ions enter the cell B) Potassium ions exit the cell
 C) The sodium-potassium pump stops D) The positive potential inside the cell increases

197. The opposite graph shows the changes experienced by a neuron exposed to a stimulus. During which stage would you expect that a new nerve impulse is generated, if another stronger stimulus affects the neuron?

- a) From (A) to (B). b) From (B) to (C).
 c) From (C) to (D). d) From (F) to (G).



198. The period during which a new nerve impulse cannot be generated is called:

- A) Depolarization B) Repolarization C) Refractory period D) Resting potential

199. What explains the importance of the resting potential in a nerve cell?

- A) It prevents the cell from responding
 B) It keeps the membrane ready to transmit the impulse when a stimulus occurs
 C) It increases the number of synapses D) It decreases the membrane permeability to water

200. The binding of a neurotransmitter to receptors leads to

- A) Closing Sodium channels in the post-synaptic cell B) Constriction of the synaptic knob
 C) Generating a new nerve impulse in the post-synaptic cell
 D) Return of the impulse to the pre-synaptic cell

201. Calcium ions The “mechanical Factor” in the synaptic area act as :

- A) A Chemical neurotransmitter B) An insulating material for the synaptic cleft
 C) An enzyme to break down acetylcholine
 D) A substance that release chemical transmitters from vesicles

202. The primary function of the enzyme that breaks down acetylcholine is :

- A) Stimulating the cell B) Transporting Sodium
 C) Returning the cell to the resting state D) Synthesizing acetylcholine

203. The nerve impulse is transmitted across the synaptic cleft by :

- A) Active transport of Sodium B) Water movement between the two cells
 C) Direct electrical jumping D) Chemical substances

204. Chemical neurotransmitters are stored inside :

- A) Receptors B) Vesicles C) Mitochondria D) Sodium channels

205. The minute space separating two neurons is called

- A) Nerve axon B) Synaptic knob C) Synaptic vesicles D) Synaptic cleft

206. The presence of “receptors” only on the post-synaptic membrane explains :

- a) The strength of the nerve impulse b) The transmission of the impulse in one direction
c) The large size of the synaptic cleft d) The breakdown of acetylcholine

207. If a substance that blocks calcium channels in the nerve endings is injected, the result will be;

- a) Increased impulse speed b) Complete cessation of signal transmission between cells
c) Transformation of the nerve impulse into a light signal
d) Spontaneous rupture of synaptic vesicles

208. Which of the following occurs immediately after the nerve impulse reaches the terminal knobs (buttons)?

- A) Calcium exits the cell B) Calcium enters and vesicles fuse with the membrane
C) Sodium channels close D) Neurotransmitter breakdown

209. The Purkinje cell, which can receive hundreds of thousands of synapses, demonstrates that:

- A) The nervous system is slow to respond B) Nerve cells function independently
C) The nervous system is an interconnected network that transmits information quickly and accurately
D) Synapses are few in the brain

210. The difference between a regular neuron and a Purkinje cell lies in :

- a) The type of ions used b) The presence of a nucleus
c) The number of neural synapses d) The method of impulse transmission along the axon

211. Electrical impulses in the NCV (Nerve Conduction Velocity) test resemble :

- A) Heartbeats B) The breathing process
C) The natural nerve impulse inside the body D) Blood flow in the veins

212. performing the NCV (Nerve Conduction Velocity) test in a “non-invasively” manner (over the skin) makes it

- a) Safe and easy for assessing nerve functions b) Inaccurate
c) Limited to the brain only d) Requiring general anesthesia

213. If an NCV (Nerve Conduction Velocity) test shows extreme slowness in signal transmission, the physician may conclude:

- a) An increase in Purkinje cells
b) Superior speed in information processing
c) A decrease in CO₂ levels
d) Nerve disorder or damage

214. The nerve impulse passing from nerve cell (X) to muscular cell (Y) is transmitted through.....

- a) the dendrites of cell (X).
b) the nerve endings of cell (Y)
c) the synaptic region between the two neurons
d) the interneurons.

215. Which of the following represents the most accurate explanation of the term "Nanotechnology"?

- a) The study of dwarfs in ancient Greek times
b) The practical application of knowledge to control materials at the nanoscale
c) Measuring the lengths of materials using the traditional meter
d) The study of large molecules in their normal state

Lesson 5:

216. If you know that the hydrogen atom is the smallest known atom, which of the following represents its approximate radius?

- a) 0.05 nm. B) 60.15 nm. C) 0.25 nm. D) 0.35 nm

217. You have a material with dimensions (20 nm, 50 nm, 200 nm). This material is classified as...

- a) zero-dimensional nanomaterial.
b) two-dimensional nanomaterial
c) one-dimensional nanomaterial.
d) three-dimensional nanomaterial

218. If the number of atoms exposed for reaction on the surface of a nanomaterial increases, this leads to

- A) chemical inactivity
B) a massive increase in chemical activity
C) transformation of matter into gas
D) increase in melting point

219. "Nano chemistry" is concerned with studying changes in properties at a small scale. Which of the following falls within its interests?

- A) Manufacturing massive devices
B) Studying planetary motion
C) Uranium decay
D) Manufacturing and describing nanomaterials in their various forms.

220. Which of the following properties does not typically change when matter is reduced to the nanoscale?

- a) Electrical conductivity b) Color c) Melting point d) Atomic mass of the element itself

221. The change in material properties at the nanoscale is due to two main factors, which are

- a) color and hardness
b) increase in the ratio of surface area to volume and quantum effects
c) melting point and electrical conductivity
d) atomic size and electron speed

222. Which of the following materials can be used as thin films?

- a) Graphene b) Gold nanoparticles c) Porous materials d) Nanowires

223. "Three-dimensional nanomaterials don't possess any nanoscale properties." How accurate is this statement?

- a) False, because they contain internal nanostructures.
b) True, because they have large dimensions.
c) True, because they can be seen with the naked eye.
d) False, because they must be in the gaseous state

224. Nanotechnology contributes to biosphere sustainability because it:

- A) Relies on polluting materials. B) Reduces the consumption of energy and resources.
C) Produces toxic waste. D) Uses fossil fuel.

225. Why is nanotechnology considered a revolution in human interaction with the biosphere?

- a) Because it increases the size of cells to be seen by the naked eye
b) Because it eliminates the need to study traditional chemistry
c) Because it relies only on radiation for treatment
d) Due to its ability to observe and control matter at the level of atoms and molecules

226. When the size of gold is reduced to the nanoscale, its color changes because:

- A) The number of electrons in its atoms decreases. B) Its interaction with light changes.
C) Its density increases D) It loses its metallic properties

227. When matter is fragmented, the relationship between surface area and volume shows that:

- A) The volume is unchanged and the surface area increases.
B) Both the volume and surface area decrease.
C) The volume decreases and the surface area does not change.
D) Neither the volume nor the surface area is affected

228. Two-dimensional nanomaterials have.....

- a) Two dimensions outside the nanoscale and one nanoscale dimension.
b) Two dimensions inside the nanoscale and one non-nanoscale dimension.
c) Two dimensions outside the nanoscale and an internal porous structure.
d) Two dimensions inside the nanoscale and an internal nanostructure

229. Thin films appear as examples of.....materials

- A) One-dimensional Nanomaterials B) Three-dimensional Nanomaterials
C) Zero-dimensional Nanomaterials D) Two-dimensional Nanomaterials

230. A patient suffers from severed motor nerve; which of the following nanomaterials is most suitable to be used as a bridge for nerve impulse transmission?

- a) Thin films. B) Quantum dots. C) Porous materials. D) Nanowires.

231. "Nanocomposites" are an example of materials

- A) 1(D B) (2) D C) (3) D D) (0) D

232. Which type of nanomaterials is best suited for manufacturing "micro- filters "for water?

- A) 3D porous nanomaterials B) 0D nanomaterial C) 2D thin film D) Quantum dots

233. Buckyballs are useful in medicine because they:

- A) Are resistant to heat. B) Contain rare minerals. C) Can carry drugs inside them. D) Absorb light.

234. In drug delivery using nanotechnology, nanoparticles help to:

- A) Spread the drug throughout the whole body. B) Increase the drug dosage.
C) Deliver the drug directly to the infected cells. D) Prevent its absorption

235. The primary benefit of enclosing a cancer drug with nanoparticles is

- A) increasing the drug's size for easier swallowing B) changing the drug's taste
C) reducing effectiveness for safety D) targeting cancerous cells only

236. Which of the following materials is most effective for creating a nanobridge between the two ends of a severed nerve?

- A) Quantum dots B) Flat graphene C) Carbon nanotubes D) Water molecule

237. Which of the following statements is correct about the different methods of cancer treatment?

- a) Conventional treatment exposes the body's cells to the toxic drug substance.
b) Side effects of treatment with nanotechnology and radiation together are very low.
c) Using nanotechnology increases the need for radiation doses.
d) Chemotherapy can only be used after the failure of treatment with nanotechnology.

238. The function of biofuel cells is similar to the process of cellular respiration in that both:

- A) Produce energy from the oxidation of glucose. B) Consume ATP molecules.
C) Store energy. D) Depend in their function on solar energy.

239. In a biofuel cell, glucose is oxidized at

- a) the positive electrode (cathode) b) inside the wires only
c) in the light lamp d) negative electrode (anode)

240. The operating principle of Biofuel Cells is inspired by

- a) wood combustion b) wave movement c) cellular respiration d) solar energy

241. The primary fuel used in biofuel cells is

- A) Gasoline B) External hydrogen gas C) Glucose D) Nano coal

242. Electrons in a biofuel cell move through an external circuit toward the

- A) Cathode B) Anode C) Human body D) Ground

243. The role of "carbon nanotubes" in biofuel cells is

- A) storing glucose B) coating the electrodes to increase surface area
C) preventing protons from reaching the cathode D) cooling the medical device

244. Which of the following organelles in a living cell performs a function similar of the positive electrode in consuming oxygen and protons to produce water?

- A) Mitochondria B) Vacuole C) Nucleus D) Cell wall

245. The movement of smart prosthetics limbs depends on.....

- A) Nano-chip commands B) large external batteries
C) wind movement D) automatic muscle response

**Unit 4:
Lesson 1:**

246. All of the following are from Earth's layers, except the.....

- a) Earth's crust. B) troposphere. C) mantle. D) core

247. Which of Earth's layers accounts for only 1% of the planet's total volume?

- a) Mantle b) Core c) Crust d) Lithosphere

248. Which of the following elements contributes to making the oceanic crust denser than the continental crust ?

- a) Magnesium and Iron b) Aluminum and Silica
c) Sodium and Potassium d) Hydrogen and Helium

249. The largest of Earth's layers by mass (representing 67% of Earth's mass) is

- A) The Crust B) The Mantle C) The Outer Core D) The Inner Core

250. Why does the inner core remain solid despite extreme temperatures?

- a) Due to sudden cooling b) Because it contains nickel
c) Because of its far distance from the surface d) Due to immense pressure

251. The Earth's magnetic field is generated by the movement of molten material in the

- A) Lower Mantle B) Outer Core C) Oceanic Crust D) Upper Mantle

252. When comparing Earth's outer core and inner core, we find that they are:

- a) Similar in components and physical state.
- B) Different in components and physical state
- c) Similar in components and different in physical state.
- D) Different in components and similar in physical state

253. Which of the following industrial applications demonstrates harnessing lithosphere's properties?

- A) Using limestone in the cement industry
- B) Formation of organic Carbon in plants
- C) Increasing wind speed on mountains
- D) Absorbing Ozone in the atmosphere

254. The Lithosphere consists of

- A) The Earth's crust only
- B) The entire mantle
- C) The crust and the uppermost part of the mantle
- D) The inner and outer core

255. The average thickness of the Lithosphere is approximately

- A) 100 km
- B) 10 km
- C) 2900 km
- D) 6371 km

256. The average thickness of the Lithosphere is approximately

- A) 100 km
- B) 10 km
- C) 2900 km
- D) 6371 km

257. Bicarbonate ions resulting from rock weathering eventually transform into

- A) Emitted volcanic gases
- B) Concentrated acid rain
- C) Calcium carbonate deposits in the seas
- D) Solid silicate minerals

258. The solubility of limestone in rainwater increases with an increase in

- A) Temperature only
- B) Pressure and CO₂ concentration
- C) Covalent bonds in the mineral
- D) Surface wind speed

259. How does the lithosphere contribute to mitigating the phenomenon of Global Warming?

- a) By releasing volcanic gases
- b) By absorbing oxygen
- c) By increasing atmospheric humidity
- d) By conversing CO₂ into bicarbonates

260. The phenomenon of "Water Hardness" results from an increased concentration of which ions?

- a) Sodium and Potassium
- b) Calcium and Magnesium
- c) Iron and Nickel
- d) Carbonates and Bicarbonates

261. The interaction of rainwater charged with CO₂ with calcite rocks leads to the formation of ...

- a) Caves and cavities
- b) Volcanic mountains
- c) Igneous rocks
- d) Continental crust

262. Why do some minerals such as feldspar and quartz remain in soil without decomposition for long periods?

- a) Because they are resistant to dissolution in weak acids.
- b) Because they react with weak acids to form a protective layer.
- c) Because they are heavier than other minerals.
- d) Because they dissolve and crystallize continuously.

263. Which of the following elements is primarily released from rocks due to weathering process and is used directly in building plant biomolecules?

- A) Iron B) Potassium C) Aluminum D) Silica

264. Which of the following minerals decomposes to release potassium ions (K^+) essential for plants?

- a) Calcite b) Phosphate c) Feldspar d) Quartz

265. Which of the following illustrates the relationship between rock properties and the occurrence of earthquakes?

- A) Harder rocks release seismic energy quickly
- B) Brittle rocks break when energy accumulates along weak faults
- C) Silica-rich rocks prevent earthquakes
- D) Carbonate rocks reduce the strength of waves

266. The currents responsible for tectonic plate movement originate in the

- A) Mesosphere B) Inner Core C) Asthenosphere D) Continental Crust

267. Which of the following figures shows the direction of convection currents that form new ocean floor?



268. The plate movement that led to the formation of the Himalayas is

- A) Divergent B) Transform (Sliding) C) Convergent D) Lateral grinding

269. The famous "San Andreas Fault" is an example of which plate movement?

- A) Continental Convergence
- B) Oceanic Divergence
- C) Transform (Sliding) movement
- D) Destructive

270. The divergence of oceanic plates (e.g., Mid-Atlantic Ridge) leads to ...

- A) The disappearance of ancient seas B) The formation of continental volcanic ranges
C) Increased thickness of the continental crust D) The formation of a new ocean floor

271. The increase in temperature as we move towards the Earth's interior is called.....

- a) Thermal equilibrium. B) Thermal pollution c) Global warming d) Thermal gradient

272. Which of the following is "NOT" among the requirements for defining a mineral geologically?

- a) Organic substance b) Regular crystalline structure
c) Naturally occurring solid substance d) Definite chemical composition

Lesson 2:

273. What is the relationship between minerals and rocks in the lithosphere?

- a) Rocks are decomposed parts of minerals.
b) Rocks and minerals are different terms for the same thing.
c) Rocks are composed of minerals bonded together.
d) Minerals are composed of small rock particles

274. Minerals contribute to maintaining Earth's stability through...

- a) Regulating global climate.
b) Supporting the rock cycle and tectonic plate movement.
c) Providing energy required for volcanoes and earthquakes.
d) Determining the paths of rivers and oceans.

275. Which of the following represents the building unit of sedimentary rocks?

- a) Organic remains. b) Tectonic plates. c) Minerals. d) Hydrocarbons

276. The hardness of quartz on the Mohs scale isapproximately

- A) 2 B) 4 C) 7 D) 10

277. The statue of Sphinx of Giza was made of Limestone rock, which has a hardness of ...

- A) 2 : 3 B) 3 : 4 C) 6 : 7 D) 7

278. The material used in making glass tools due to its resistance to scratching is ...

- A) Gypsum B) Mica C) Calcite D) Quartz

279. Which of the following rocks is most resistant to natural erosion processes?

- A) Limestone B) Calcite-rich rocks C) Gypsum D) Granite

- 280.** Why is Granite preferred for flooring in high-traffic areas like stations and hospitals instead of Limestone? Or Minerals with high hardness are used in crowded areas to ensure
- A) Resistance to wear and scratching B) Floor shine C) Ease of cleaning D) Cost reduction
-
- 281.** If you have a sample of Calcite (Hardness 3), which tool can scratch it according to field hardness tests ?
- a) Fingernail b) Copper coin c) Gypsum piece d) Iron nail
-
- 282.** A student tried to scratch a rock sample with its fingernail and failed, but it was scratched by a metal coin. What is the approximate hardness of this sample ?
- a) 1.2 b) 2 c) 2.8 d) 5
-
- 283.** Which of the following minerals represents degree (10), the highest level of hardness on the Mohs scale?
- a) Quartz b) Gypsum c) Diamond d) Feldspar
-
- 284.** The mineral malachite always appears in thecolour
- A) Yellow B) Red C) Green D) Blue
-
- 285.** "Fool's Gold" is a name given to the mineral
- Or Which of the following minerals possesses a metallic luster?
- A) pyrite B) Malachite C) Galena D) Feldspar
-
- 286.** Although the similarity in color and luster between Gold and Pyrite, how can a geological engineer definitively distinguish between them on-field ?
- a) By observing the color only b) By using a hardness test or measuring specific gravity
c) By examining the cleavage in one direction d) By checking the transparency of the sample
-
- 287.** Specific gravity is measured by comparing the mass of a volume of a mineral to the mass of the same volume of water at a temperature of
- A) 0°C B) 4°C C) 25°C D) 100°C
-
- 288.** What is the scientific explanation for the "conchoidal fracture" observed in Quartz?
- a) Presence of weak bonding planes b) High Lead content
c) Exposure to atmospheric humidity
d) Strong chemical bonds in all directions and absence of cleavage (Because it lacks planes of weakness (cleavage), causing it to break irregularly.)
-
- 289.** The specific gravity of the mineral galena is considered high because it ...
- A) contains silica B) contains the heavy element Lead
C) has a glassy luster D) has high hardness

- 290.** The pattern that appears when a mineral breaks irregularly and does not follow cleavage planes is called
- A) Streak B) Fracture C) Luster D) Hardness
-
- 291.** The mineral characterized by perfect cleavage in one direction, appearing as thin sheets, is ..
- A) Quartz B) Mica C) Feldspar D) Calcite
-
- 292.** The mineral group that "dominates" the composition of most of the Earth's crust is
- A) Oxides B) Silicates C) Sulfides D) Carbonates
-
- 293.** Adjusting electronic signals" in mobile phones functionally depends on the mineral
- A) Quartz B) Iron C) Gold D) Cobalt
-
- 294.** Which of the following represents an application of the "electrical oscillation" of minerals? Or Which of the following technological industries would be completely "disrupted" if quartz were lost?
- A) High-speed train B) Wind turbines C) Lithium batteries D) GPS devices
-
- 295.** The element iron is used in the manufacture of "electric cars" to achieve the goal of
- A) increasing weight B) reducing speed
C) sustainability and reducing pollution D) changing the shape of roads
-
- 296.** Egypt's "Heading to Future" project primarily aims to
- A) extract gold from mountains B) enhance strategic connectivity and support export ports
C) build new pyramids D) increase desert area
-
- 297.** The mineral called the "oil of the twenty-first century" is
- A) Quartz B) Titanium C) Calcite D) Lithium
-
- 298.** Calcium and Iron" compounds are used in the medical field as
- a) Surgical scalpels b) Anesthetics c) Nutritional supplements d) Equipment cleaners
-
- 299.** Imaging internal body organs with extreme clarity and high precision without surgical intervention is a description of the function of
- A) Traditional X-rays B) Sonar C) Magnetic Resonance Imaging (MRI) D) Electronic Microscope
-
- 300.** Which of the following medical technologies depends on "Neodymium (Nd), Iron (Fe), and Boron (B) alloys"?
- a) Magnetic Resonance Imaging (MRI) b) Dental implants
c) Laser glucose monitoring d) Prosthetic limbs

- 301.** An element that plays a pivotal role in the manufacture of smart "lithium-ion batteries" is ...
a) Gold b) Silver c) Cobalt d) Magnesium
-
- 302.** Which of the following factors can change the type of rock without changing its chemical composition?
A) Complete melting B) Rapid cooling C) High pressure and heat D) Chemical weathering
-
- 303.** The presence of large crystals inside an igneous rock usually indicates that the rock:
A) cooled slowly deep within the Earth B) was exposed to mechanical weathering
C) was formed by a rapidly erupting volcano D) had its layers deposited at the bottom of the sea
-
- 304.** Which of the following processes is considered the beginning of the formation of sedimentary rocks?
A) Melting B) Weathering and erosion
C) Crystallization from magma D) Rearrangement of minerals
-
- 305.** When studying a rock that contains clear layers and grains of varying sizes, it can be concluded that this rock was formed as a result of:
A) cooling of magma B) pressure on sediments over a long time
C) change in minerals under severe heat D) melting of an older rock
-
- 306.** Sediments transform into "sedimentary rocks" as a result of
- A) Fragmentation by weathering B) Their accumulation and pressure over time
C) Exposure to extreme cold D) Boiling in the seas
-
- 307.** Lava on the surface" upon cooling gives rocks
A) Stratified sedimentary B) Igneous C) Pressure-metamorphic D) Fine sand
-
- 308.** The "Rock Cycle" often begins with
a) Igneous rocks b) Sedimentary rocks c) Metamorphic rocks d) Fine sands
-
- 309.** The glass we use daily depends in its manufacture on Or The mineral "Silicon" is an element mainly extracted from
A) cooling of magma B) pressure of limestone C) melting of marble D) Sands
-
- 310.** Which of the following processes is NOT from the ways of mineral formation in the Earth's crust?
a) Biological decomposition of organic substances.
b) Rearrangement of mineral atoms due to pressure and heat.
c) Precipitation of salts when water evaporates.

d) Crystallization of magma upon cooling

Lesson 3:

311. The "Organic Origin Theory" states that most oil is formed from the decomposition of.....

- a) ancient forest plant remains b) sedimentary rock remains
c) marine microorganisms remains d) terrestrial plants and animals remains

312. Which of the following methods is used to extract petroleum from rocks?

- A) Conventional drilling and crude oil extraction B) Direct distillation of water
C) Distillation under atmospheric pressure only D) Iron extraction

313. Oil companies use 3D seismic sensing technology to.....

- a) identify the oil accumulation sites more accurately. b) refine petroleum at the well site
c) convert heavy hydrocarbons into lighter ones. d) measure the Earth's internal temperature

314. The rocks in which hydrocarbons are found within their folds are called.....

- a) cap rocks. B) source rocks. C) igneous rocks d) metamorphic rocks

315. The oil accumulation underground within rock layers surrounded by dome-shaped impermeable layers is called

- a) source rocks. B) Rock caverns. C) oil traps. D) oil refineries

316. Strong steel casings (pipes) are used inside the well during drilling for oil extraction.....

- a) heat the oil. B) prevent leaks and ensure well stability.
C) cool the drilling machines. D) convert oil to gas

317. When a large volume of air is pushed into a small cavity inside rocks, the pressure within the cavity?

- a) decreases. B) increases. C) remains constant. D) vanishes

318. Crude oil is heated in special furnaces before entering the distillation tower to a temperature...

- a) 100 C° b) 250 C° c) 400 C° d) 1000 C°

319. What is the purpose of the fractional distillation process for petroleum?

- A) Separating compounds based on color
B) Separating compounds based on their density and different boiling points
C) Mixing chemical compounds together D) Producing water

320. In oil traps, the vertical arrangement of materials from top to bottom is.....

- a) Oil, Gas, Water. B) Water, Oil, Gas . C) Gas-Oil, Water. D) Oil, Water, Gas

321. In the fractional distillation tower, diesel and kerosene condense at.....

- a) the top of the tower. B) the bottom of the tower
c) the middle of the tower. D) the bottom and the top of the tower

322. The substance that remains at the bottom of the fractional distillation tower is.....

- a) Benzene. B) Kerosene. C) Bitumen. D) Naphtha

323. Which of the following products results from the fractional distillation of petroleum?

- A) Gasoline, diesel, wax, and asphalt B) Water, salt, limestone, and iron
C) Uranium, silicon, and quartz D) Gypsum, limestone, and clay

324. Why are some microorganisms (microbes) used in petroleum extraction?

- A) To color the petroleum B) To break down rocks and mobilize oil trapped in rock pores
C) To freeze petroleum D) To generate electricity directly

325. What is the main factor affecting the quantity of petroleum extracted from rocks?

- A) The amount of salts in surface water B) The permeability and pore size of the rocks
C) Air temperature only D) The type of surrounding vegetation

326. Resins and synthetic fibers derived from petrochemicals are used in the manufacture of....

- a) jet fuel. B) electronic devices. C) road paving. D) ship fuel

327. When nuclear fission occurs in a uranium nucleus, the energy is released in the form of:

- A) Heat only B) Light only C) Heat, kinetic energy, and nuclear particles D) Sound waves

328. The main function of nuclear rods inside nuclear reactors is.....

- a) cooling the reactor. B) acting as nuclear fuel.
C) absorbing external radiation. D) storing nuclear waste

329. Which of the following illustrates the source of nuclear energy used at the El Dabaa plant?

- A) Solar heat B) Coal C) Uranium D) Natural gas

330. Atoms of the same element that have the same atomic number but differ in mass number are called.....

- A) ions. B) molecules. C) isotopes. D) compounds.

331. The most common isotope of uranium in nature is.....

- a) U-234. B) U-235. c) U-238 d) U-239

332. Modern nuclear reactors, characterized by their ease of installation and lower fuel use, are called.....

- a) giant reactors.
B) small modular reactors.
C) second-generation reactors.
D) third-generation reactors

333. massive energy is released from uranium atoms during the process of

- a) nuclear meltdown. b) nuclear fusion. c) nuclear fission d) nuclear combination

334. Geiger counters are used in nuclear sites to.....

- a) measure reactor temperature. B) measure vapor of radioactive elements.
c) detect uranium isotopes. D) monitor radiation levels

335. Which of the following characteristics makes rocks a good source for nuclear energy?

- A) Low density and containing mica
B) Containing radioactive minerals with unstable nuclei
C) Its dark color
D) High permeability to water

336. Why is geothermal energy considered a sustainable energy source?

- A) Because it relies on fossil fuels
B) Because it is continuous and renewable due to the heat of the Earth's interior
C) Because it produces high pollution
D) Because it is limited and depletes quickly

337. Which of the following uses demonstrates the exploitation of geothermal energy in daily life?

- A) Operating mobile phones B) Heating homes and farms
C) Glass manufacturing D) Iron production

338. What role do groundwater reservoirs play in geothermal power plants?

- A) Storing solar radiation B) Transferring heat from hot rocks to the turbines
C) Generating electricity directly without heat D) Increasing air pressure

339. Which of the following statements correctly describes the EGS project?

- A) It relies on concentrated solar power
B) It uses deep drilling to pump water into hot rocks to generate electricity
C) It burns coal to produce steam
D) It relies on wind to heat the rocks

340. Car sensors and safety systems are considered an application for the use of ...

- A) Compressed Air Energy Storage (CAES).
C) piezoelectricity.

341. What is the main environmental benefit of using nuclear and geothermal energy instead of fossil fuels?

- A) Increased coal consumption B) Reducing greenhouse gas emissions
C) Increased production of toxic gases D) Greater consumption of river water

- 342.** Which of the following situations best illustrates a practical application based on the principle of storing energy using compressed air inside lithospheric caverns?
- A) Storing electricity in lithium batteries inside industrial buildings
 - B) Using natural salt caverns to compress and release air to power generators during peak consumption
 - C) Increasing wind speed around turbines to boost generation efficiency
 - D) Storing natural gas in underground pipelines
-
- 343.** Natural hydrogen relies on a reaction inside the rocks. What is the most logical result if the rocks have a low content of the Olivine mineral?
- A) Natural hydrogen production increases due to high rock permeability
 - B) Hydrogen production stops completely because rocks become unable to absorb water
 - C) The rate of natural hydrogen formation decreases due to the absence of the essential element in the reaction
 - D) Pressure increases inside the rocks, leading to their explosion
-
- 344.** Which explanation clarifies why some countries prefer storing compressed air energy inside rock caverns instead of industrial concrete structures?
- A) Rocks provide a stable temperature that reduces energy loss during storage
 - B) Concrete structures are more expensive but store more energy
 - C) Compressed air moves faster inside concrete compared to rocks
 - D) Rocks completely prevent air loss during operation
-
- 345.** Electric charges are generated on the surface of piezoelectric materials when exposed to.....
- a) intense light.
 - b) intense heat.
 - C) bending or vibration.
 - D) air currents
-
- 346.** One of the main advantages of geothermal energy is that.. ..
- a) It is dependent on solar heat.
 - B) It is available only in summer.
 - c) It is a clean energy source available year-round.
 - D) It requires drilling to great depths
-
- 347.** The main purpose of injecting water into deep rock fissures is.....
- a) fragment hard rocks.
 - B) gain extreme heat from rocks
 - c) clean rocks of deposits.
 - D) storing groundwater for drinking
-
- 348.** The imbalance in the distribution of the electrical charges in the structure of a piezoelectric material occurs due to.....
- a) the divergence of the material's molecules when melted
 - b) the breakdown of chemical bonds between atoms of the material
 - c) an increase in the surface area of the material when fragmented
 - d) The deformation of the crystal structure of the material when pressed

349. The new mineral formed from the reaction of water molecules with iron in olivine inside rock fractures is.....

- a) quartz. B) serpentine. C) gypsum. D) calcite

350. Which conclusion is the most accurate when comparing compressed air energy and natural hydrogen energy as resources from the lithosphere?

- A) Both require high heat from Earth's interior for their production
 B) Natural hydrogen is produced via a chemical reaction inside the rocks, while compressed air relies on the physical properties of the rocks for energy storage
 C) Compressed air is more environmentally hazardous because it releases greenhouse gases
 D) Neither can be stored in the lithosphere due to poor rock permeability.

Question 2:

Essay Questions:

A) Write the scientific term for each of the following statements:

1) Represents the maximum pressure exerted by the blood on the artery walls. when the heart (left ventricle) contracts to push the blood to the parts of the body.	(-----)
2) Massive rock fragments that resemble floating plates, which constitute the lithosphere	(-----)

B) Give reasons for:

- Biosphere is considered an integrated system that includes all living organisms and their habitats on Earth?
(-----)
- The types of living organisms differ in different environments?
(-----)
- Plants are considered biotic factors in the ecosystem?
(-----)
- The ecosystem is considered an integrated unit in nature?
(-----)
- Predators are necessary for the stability of the ecosystem.
(-----)
- The numbers of large predators (such as lions) are very few consider to the numbers of preys in the ecosystem?
(-----)
- Carbohydrates are considered the main source of energy in living organisms?
(-----)

- 8) Proteins are necessary for building the body of living organisms?
(-----)
- 9) The ability of giant trees to lift water to biggest heights.
(Water ascends in plants despite the lack of an internal pump?)
(-----)
- 10) The presence of valves in the heart.
(-----)
- 11) Hemoglobin affects blood viscosity .
(-----)
- 12) Aerobic cellular respiration is more efficient at energy production than an aerobic respiration?.
(-----)
- 13) Cellular respiration is considered an exothermic reaction?
(-----)
- 14) A disturbance in body functions occurs when metabolic waste accumulates.
(-----)
- 15) The nephron is considered the functional unit of the kidney
(-----)
- 16) The volume of Urine increases when large amounts of water are drinking.
(-----)(---
- 17) Why losing large amounts of water is considered "dangerous to human life"?
(-----)
- 18) Excreting a large amount of Sweat in hot weather helps the body remain in Homeostasis.
(-----)
- 19) The skin plays a vital role in "thermal regulation" in hot environments.
(-----)
- 20) The skin plays a dual role in human life.
(-----)
- 21) The liver acts as a main "processing station" for toxins.
(-----)
- 22) Ammonia is converted into Urea in the body before it is excreted.
(-----)
- 23) Excretion is essential for maintaining the biological balance (or Homeostasis) of the living organism.
(-----)

- 24) Animal respiration contributes to the sustainability of plant life.
(-----)
- 25) Phosphorus is not considered a pollutant of the atmosphere.
(-----)
- 26) Dendrites contribute to increasing the efficiency of data reception.
Or The nervous system operates at a speed that exceeds the hormonal system.
(-----)
- 27) Inhibiting the Sodium-Potassium pump by the toxin Ouabain leads to the cessation of nervous system function.
(-----)
- 28) Hyperpolarization occurs immediately after repolarization.
(-----)
- 29) The nerve impulse is called an electrochemical change.
(-----)
- 30) The presence of a synaptic cleft between two nerve cells is essential despite its extremely small size.
(-----)
- 31) Sodium ions are considered the key to starting the nerve signal.
(-----)
- 32) Carbon Nanotubes are used in the design of future space elevators.
(-----)
- 33) Nanotechnology is considered a bridge between biology, physics, and chemistry in the service of environmental sustainability.
(-----)
- 34) Rocks differ in their properties even though they are composed of common minerals.
(-----)
- 35) Minerals are considered the basis for modern industries such as medicine and technology.
(-----)
- 36) Metamorphic rocks do not usually contain fossils.
(-----)
- 37) The rock cycle is a continuous process despite the difference in geological ages.
(-----)
- 38) "Silicon" contributes to reducing reliance on fossil fuels.
(-----)
- 39) Titanium is considered the first choice in bone implant surgeries.
(-----)

40) The lithosphere represents a "natural reservoir" that ensures technological development.

(-----)

41) Lithosphere rocks remain an "inexhaustible treasure" despite consumption.

(-----)

C) What happens if:

1) Receptors are absent in the post-synaptic membrane.

(-----)

D) Compare the following:

1) Compare between exothermic reactions –endothermic reaction in term of :

P.O.C	exothermic reactions	endothermic reaction
Sign of ΔH		
H_R , H_P		

2) Compare the continental crust and oceanic crust (considering their predominant chemical composition and density).

P.O.C	continental crust	oceanic crust
chemical composition		
density		

3) Compare glassy luster and metallic luster, providing an example for each from your study.

P.O.C	glassy luster	metallic luster
example		

4) Variant questions:

1- How do you explain that a "biosphere" is a higher organizational level than an "ecosystem"?.

(-----)

2- Explain: Why is a complex food web "more flexible" against changes

(-----)

3- Trace the impact of groundwater pollution with toxic chemicals on the food chain.

(-----)

4- Explain how a "food web" reflects the stability or disturbance of a biological community?

(-----)

5- Clarify the importance of "chlorophyll" in the continuity of the biosphere?

(-----)

6- The following figure represents a food web. Assuming the plant produced energy equal to 300,000 J.

A) According to the diagram, what is the minimum energy the hawk might receive from the plant? -----.

B) Explain the food chain that leads to the hawk receiving the minimum amount of energy from the plant.

7- what happen in the case of: the absence of decomposers from the ecosystem.

(-----)

-----)

8- In the light of your study, what is the role of modern technology in saving the Iberian lynx herds from extinction?

(-----)

9- Explain the role of mitochondria in "recharging" the ADP molecule .

(-----)

10- Explain :The importance of the presence of companion cells associated with sieve tubes.

(-----)

11- Explain: The importance of lignin in xylem vessels for tall plants such as trees .

(-----)

12- Explain why :There are two types of vascular tissues (xylem and phloem) in plants?

(-----)

13- Trace : the pathway of chemical energy stored in glucose during anaerobic.

(-----)

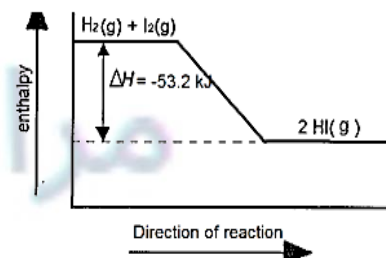
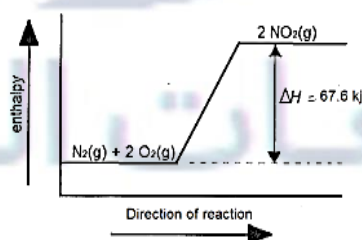
14- Study the following figures then answer:

(A)

(B)

a- Which reaction required energy to occur? -----

b- Which reaction will increase the temp. of the surrounding medium? -----



15- If you know the following reaction take place under hard condition $\text{H}_2\text{O}_{(l)} \rightarrow \text{H}_2\text{O}_{(s)} + 6.03 \text{ KJ/mole}$, [H = 1 , O = 16] Calculate the amount of heat lost from 252 g of water to freeze.

(-----)

16- From the following equation: $2S_{(s)} + 3O_{2(g)} \rightarrow 2SO_{3(g)}$, $\Delta H = -790 \text{ KJ}$ What is the change value in heat content of combustion of 0.972 g of Sulphur [S = 32]

(-----)

17- From the following reaction: $CH_3OH + 3 O_2 \rightarrow 4 H_2O + 2 CO_2$ $\Delta H = -726.5 \text{ kJ/mol}$ - If an amount of energy equal to 4359 kJ is released, calculate the mass of methanol burned? (C= 12 , H = 1 , O = 16).

(-----)

18- Explain: why metabolic wastes are considered "by-products" despite originating from essential reactions.

(-----)

19- Explain: Why does the accumulation of CO_2 "threaten vital processes"?

(-----)

20- Explain: the role of the lungs in the excretion process?.

(-----)

21- Explain: The bioartificial kidney can contribute to reducing dependence on traditional dialysis.

(-----)

22- Clarify the role of humans in disrupting the carbon cycle.

(-----)

23- Explain: the role of photosynthesis as a chemical driver of the carbon cycle.

(-----)

24- Explain: The nitrogen cycle represents an example of cooperation among living organisms.

(-----)

25-Clarify the role of nerve endings in converting the electrical signal into a chemical communication language. (What is the direct effect of the entry of calcium ions the synaptic knob upon the arrival of a nerve impulse?

(-----)

26- Explain: The role of "selective permeability" during polarization state.

(-----)

27- How does the nervous system contribute to the stability of the biosphere?

(-----)

28- What are the types of nerve cells inside the human body?.

(-----)

29- Explain: Nanomaterials have a higher capacity for chemical interaction.

(-----)

30- Explain: The classification of Quantum Dots based on their dimensions.

(-----)

31- Explain: The increase in hardness of Nano-copper compared to ordinary copper.

(-----)

32- Explain: why traditional cancer treatments are called a double-edged sword.

(-----)

33- Explain the operating principle of Neural Nano-electrodes.

(-----)

34- Explain how nanotechnology can improve the efficiency of biofuel cells.

(-----)

35- Explain the role of "blood glucose" and the sustainability of implanted medical devices.

(-----)

36- The opposite figure shows a model of a section in the Earth. Study it carefully, then answer:

(a) What is the chemical composition of layer (1)? -----

(b) What is the physical state of layer (2)? -----

37- Describe (using equations or explanation) how the lithosphere helps regulate the carbon cycle and reduce atmospheric CO₂ levels.

(-----)

(-----)

38- How do porous volcanic rocks (such as Zeolites) function as a sustainable technological solution for water-related issues.

(-----)

39- Explain: Silicate rocks (such as quartz) are considered more resistant to weathering than limestone. (Or Rocks that are composed of Carbonate salts, such as limestone, develop more caves and cavities than rocks composed of Silica.)

(-----)

40- Explain: Why is the chemical weathering of rocks considering a "natural production line" for the sustainment of life. (Or Chemical weathering of rocks plays a role in supplying plants with the minerals necessary for their growth.)

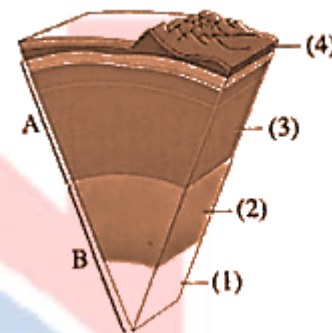
(-----)

41- Explain: Although the speed of tectonic plates is very small, its effects are significant and visible.

(-----)

42- Explain: Convergent movement contributes to the formation of towering mountain ranges. (Or Mountain ranges appear in areas of Tectonic plate collision, whereas they do not appear in areas of plate divergence.)

(-----)



43- Given an iron nail and an Alabaster sample, how can you practically prove that Alabaster is less hard?

(-----)

44- Explain: "Mineral color alone cannot be depended as a primary identifying characteristic." give two examples from your studied to support your answer.

(-----)

45- All that glitters is not gold." Apply this saying scientifically to Gold and Pyrite, explaining the fundamental differences between them.

(-----)

46- Explain: how studying the physical properties of minerals contributes to maintaining the stability and continuity of the lithosphere's balance.

(-----)

47- Cleavage is a property that must be studied accurately when selecting rocks for construction." Discuss this statement, explaining the engineering risks that may arise from neglecting this property.

(-----)

48- Infer the environmental role of iron in the modern transportation industry.

(-----)

49- Two samples of different minerals (A) and (B) have the same volume, with masses of 60 g and 75 gm respectively and the mass of the same volume of water at a temperature of 4°C is 10 gm. Calculate the specific gravity of each mineral.

(-----)

50- How can piezoelectricity be used in large shopping centers?

(-----)

مراجعات النخبة

Question 1: Choose the correct answer from the following:**Lesson 1:**

1. Which of the following most accurately describes the Biosphere?
 - A. The layer of gases surrounding the Earth.
 - B. Living organisms and their habitats on Earth.
 - C. The water found on the Earth's surface.
 - D. The rocks that form the Earth's crust.
2. The biosphere is considered an "integrated system" because
 - A) Every organism in it lives in isolation from the others
 - B) It is the largest sphere in terms of geological size
 - C) The survival of organisms depends on complex interactions
 - D) It contains only rocks
3. Which of the following substances is considered from the reactants and products in the photosynthesis process?
 - a. Oxygen.
 - b. Water.
 - c. Carbon dioxide.
 - d. Glucose
4. Which of the following processes illustrates the role of the biosphere in influencing the components of the atmosphere?
 - A) Plants absorb carbon dioxide to produce food
 - B) Rocks crumble due to the growth of large tree roots
 - C) Evaporation of sea and ocean water by solar heat
 - D) Groundwater flow between porous soil layers.
5. Which of the following relationships demonstrates the integration of Earth's spheres?
 - A. The decomposition of dead leaves in the soil by bacteria.
 - B. The movement of wind above the sea surface only.
 - C. The evaporation of water from the surface of rocks.
 - D. The formation of mountains from volcanic lava.
6. Which process represents the only "pathway" for water from the biosphere to the atmosphere according to the plant life cycle?
 - A) Respiration.
 - B) Photosynthesis.
 - C) Transpiration.
 - D) Decomposition.
7. A factory disposed of its chemical waste into a river. After a while, scientists noticed the death of all algae in this river, which caused an increase in the percentage of carbon dioxide gas in the air surrounding the area. How do you evaluate this situation in terms of (spheres interaction)?
 - A) The imbalance started in the atmosphere then moved to the hydrosphere and lithosphere.
 - B) Pollution in the hydrosphere disrupted the biosphere's function in purifying the atmosphere.
 - C) The hydrosphere was affected by waste, but the atmosphere's connection is merely a climatic coincidence.
 - D) The hydrosphere was affected by waste, but the atmosphere's connection is merely a climatic coincidence.
8. The accumulation of dead organisms' remains over millions of years leads to the formation of fossil fuels (such as coal and oil) within the Earth's crust. This proves that

- A) The biosphere controls the formation of minerals.
B) The biosphere contributes to the formation of lithosphere resources.
 C) The lithosphere is solely responsible for the decomposition of organisms.
 D) The lithosphere is not affected by living organisms.
- 9. A farmer noticed that his crop grows better in soil rich in earthworms compared to soil without them. Which of the following statements applies the concept of interaction between the biosphere and lithosphere to explain this?**
 A) Worms absorb sunlight and transfer it to plant roots.
 B) Worms release nitrogen gas directly into the atmosphere.
C) Worms aerate the soil and decompose organic matter within it.
 D) Rocky soil prevents worms from moving, which protects the plant.
- 10. Scientists search for ancient carbon traces in certain layers of sedimentary rocks to estimate the age of forests that existed in that area. This scientific activity relies on the fact that?**
 A) The lithosphere takes carbon from the atmosphere.
 B) The hydrosphere converts living organisms into rocks.
 C) The biosphere is what creates sedimentary rocks.
D) Remains of the biosphere are preserved and become part of the lithosphere.
- 11. Which of the following processes represents an interaction that links the biosphere, atmosphere, and lithosphere all at once?**
 A) Animals breathing oxygen. **B) Plants absorbing water, salts, and CO_2 to produce food.**
 C) Water evaporation from the ocean surface. D) Volcanic eruptions on the ocean floor.
- 12. In the ecosystem, sunlight represents a/an:**
 A. Biotic factor. B. Reproductive factor. **C. Abiotic factor.** D. Genetic factor.
- 13. Which of the following organisms represents the "link" that returns matter from the final consumer back to the producer ?**
 A) Algae. B) Hawk. **C) Fungi.** D) Rabbit.
- 14. What makes a lake a balanced ecosystem, according to you have studied ?**
 A) The presence of fish only. B) The depth of the water.
 C) Its connection to the atmosphere.
D) The exchange of matter and energy between biotic and abiotic elements.
- 15. Which of the following examples illustrates an interaction between Biotic and Abiotic Factors?**
 A. A lion preying on a deer. **B. A plant absorbing sunlight to produce its food.**
 C. A fruit decaying due to fungi. D. The formation of a community of birds in a forest.
- 16. Which of the following represents the correct hierarchy from the most specific to the most general?**
A) Ecosystem → Biome → Biosphere. B) Ecosystem → Biosphere → Biome.
 C) Biosphere → Ecosystem → Biome. D) Biosphere → Biome → Ecosystem.

17. Which of the following is an example of the first level in the hierarchy of life organization on Earth?
 A) A single tree in a forest. B) A herd of antelope in the African savanna.
 C) All forms of life on Earth. D) A forest that includes trees, herbaceous plants, insects, and bird.
18. The basic building block of the biosphere in the hierarchy is the
 A) Cell. B) Individual. C) Atom. D) Rock.
19. When individuals of the same species share the same place and time and interact for food, they form a
 A) Integrated ecosystem. B) Biological population. C) Hydrosphere. D) Biological community.
20. A herd of antelope living in the African savanna at a specific time represents the level of a
 A) Individual organism. B) Biome. C) Lithosphere. D) Biological population.
21. A forest containing trees, insects, and birds represents a level of...
 A) Biological population. B) Biological community. C) Individual. D) Biome.
22. Which of the following levels represents a collection of multiple species living and interacting in one area?
 A. Organism. B. Population. C. Community. D. Ecosystem.
23. When several ecosystems share similar climatic characteristics and dominant organisms, they form what is known as a
 A) Biosphere. B) Bio-environment. C) Biological community. D) Biome.
24. Major deserts that share together in harsh climate characteristics and drought-adaptive plants, are known as.....
 A) Biosphere. B) Bio-environment. C) Biological community. D) Biome.
25. The diversity of organisms in rainforests differs from deserts due to.....
 A) Difference in the type of consumer organisms only. B) Difference in climatic characteristics.
 C) The lithosphere is missing in forests. D) Absence of bacteria in deserts.
26. Energy exchange in the biosphere occurs primarily through
 A) Igneous rocks. B) Wind movement only.
 C) Food chains and webs. D) Freezing of water at the poles.
27. "Tough fibers" in food are classified as energy.
 A) lost as heat. B) used in movement. C) resulting from respiration. D) stored in waste.
28. Plants are considered Autotrophic Organisms because they:
 A. Consume other organisms to obtain energy.
 B. Obtain their food only from salts and minerals.
 C. Produce their own food from inorganic substances.
 D. Rely on fungi for food decomposition.
29. Which of the following processes represents the conversion of light energy into chemical energy?
 A. Cellular respiration. B. Photosynthesis. C. Organic decomposition. D. Digestion.
30. Which of the following organisms can perform photosynthesis ?
 A) Fungi. B) Primary consumers. C) Herbivores. D) Some specialized bacteria.

31. Which of the following shows the relationship between trophic patterns and chemical compounds?
- A. Autotrophic organisms make organic compounds that store energy.
 B. Heterotrophic organisms consume salts only.
 C. Decomposer organisms use light to make proteins. D. All organisms use light energy directly.

32. Which of the following is expected to occur in the absence of decomposers from the ecosystem?

A) Increased rate of energy transfer. B) Increased in the number of top predators.
 C) Faster plant growth. D) Accumulation of organic matter.

33. If the light intensity decreases in an environment, what is the probable effect on energy levels in the ecosystem?

A. Food productivity increases. B. The amount of glucose produced decreases.
 C. Plant biomass increases. D. No change occurs

34. If we assume a plant produced energy equal to 40,000 J, then the total energy lost by the secondary consumer as heat, energy used in its biological processes, and energy stored in undigested materials equals

A) 40 J. B) 360 J. C) 400 J. D) 3600 J.

35. In opposite figure: What is the ratio of the mass available to secondary consumers consider to producers?

A) 0.187%. B) 1.37%. C) 4.62%. D) 10%

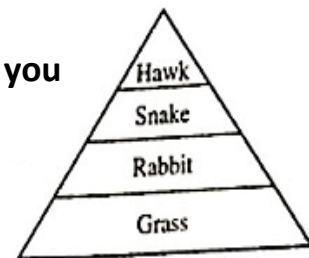
36. All four groups (carbohydrates, proteins, lipids, and nucleic acids) share the characteristic that they are

A) They store genetic information.
 B) They were dissolving easily in water.
 C) They were function as enzymes to regulate vital processes.
 D) They are organic compounds mainly containing carbon and hydrogen.



37. The opposite figure shows the energy pyramid in a balanced ecosystem, if you know that the amount of energy transferred to the snake is 20 J, what is the amount of the lost energy starting from the primary consumer till the tertiary consumer?

A) 2 J. B) 1980 J. C) 2000 J. D) 198 J.



38. The relationship between the number of glucose molecules in disaccharide and polysaccharide and their solubility in water is relationship

A) direct. B) inverse. C) constant. D) not exists.

39. The chemical bond that stores the greatest amount of energy in the ATP molecule is located between

A) Ribose sugar and the nitrogenous base. B) The first and second phosphate groups.
 C) The second and third phosphate groups. D) Carbon and hydrogen in the sugar.

40. "Cellulose is involved in building cell walls, while starch is for storage" Which of the following explains this difference ?
 A) Difference in the elements composing them. B) Difference in biological function.
 C) Presence of phosphorus in starch. D) Solubility of cellulose in water.
41. Why does the cell not use glucose energy directly without an intermediate compound (ATP)?
 A) Because glucose is a complex sugar. B) Because glucose does not contain energy.
 C) Because ATP molecules have a simple structure.
 D) Because ATP represents a continuous and renewable energy.
42. "Chitin" in insects and "Cellulose" in plants are similar in the function of
 A) Both are rapid sources of energy. B) Both are stored in the liver.
 C) Both dissolve in water. D) Both are involved in forming support structures.
43. The glucose molecule releases its energy in the cell to form:
 A. DNA. B. ADP. C. ATP. D. RNA.
44. The third bond in the (ATP) molecule is characterized by being:
 A. Weak and does not store energy. B. Strong and stores energy available for release.
 C. An ionic bond between two metallic atoms. D. A hydrogen bond between two water molecule.
45. If you know that the number of hydrogen atoms in a monosaccharide = X, what is the number of carbon atoms?
 a. $\frac{1}{2} X$. b. 2 X. c. 3 X. d. X^2 .
46. A CGM device helps patients by monitoring
 A) Heart rate. B) Blood sugar levels and carbohydrate availability.
 C) Oxygen levels. D) Blood viscosity.
47. Adjusting diet pattern based on a CGM device improves
 A) Bone density. B) Stability of energy levels. C) Speed of thinking only. D) Heart rate.
48. When a person has a deep wound, a doctor advises increasing the intake of protein-rich foods. What is the scientific explanation for this?
 A) Because proteins are involved in building body tissues and replacing damaged ones.
 B) Because proteins are the primary source of energy.
 C) Because proteins store energy for long periods.
 D) Because proteins prevent water loss from the wound.
49. Proteins that fight infection are called
 A) Enzymes. B) Immune bodies. C) Keratin. D) Phospholipids.
50. Which of the following does NOT contain nitrogen in its structure?
 A) Immune bodies. B) Enzymes. C) Muscles. D) Plant cell wall.
51. Proteins are distinguished from carbohydrates by the essential presence of the element A) Carbon. B) Nitrogen. C) Hydrogen. D) Oxygen.
52. Which of the following statements accurately explains the role of proteins?
 A. They store long-term energy. B. They form cell walls.
 C. They accelerate biological reactions and build tissues. D. They carry genetic information.

53. "Cholesterol" in the human body is involved in the formation of.....
A) Vitamin D. B) Starch. C) Nucleic acids. D) Muscle fibers.
54. Assuming that the amount of energy obtained by the body when oxidizing 5 grams of sugar equals (X), what is the approximate amount of fat in grams that the body needs to obtain the same amount of energy?
a. 2. b. 5. c. 10. d. 15.
55. The unit of measurement (kJ/g) is used to express
A) The molar mass of chemical compounds.
B) The energy required to raise the temperature of water. C) The heat capacity of water.
D) The amount of heat produced by the combustion of one gram of a substance.
56. The basic unit for measuring caloric content is ...
A) kJ/g. B) cal / J. C) kCal/g. D) kcal/J.
57. If you have 1 Kcal, how much does that equal in Kilojoules?
A) 0.418 KJ. B) 41.8 KJ. C) 418 KJ. D) 4.18 KJ.
58. Which of the following foods would you expect to give the highest ΔT value when one gram of it is burned in a calorimeter?
A) A piece of bread. B) A piece of muscle fiber meat.
C) A drop of olive oil. D) A piece of cucumber.
59. Which of the following alternatives represents the correct order for the speed of obtaining energy ?
A) Starch $\rightarrow$ Fats $\rightarrow$ Glucose. B) Glucose $\rightarrow$ Sucrose $\rightarrow$ Starch.
C) Cellulose $\rightarrow$ Glucose $\rightarrow$ Fats. D) Glycogen $\rightarrow$ Protein $\rightarrow$ Sucrose.
60. Why is DNA, and not RNA, responsible for transporting genetic information across generations?
A) Because it is smaller in size. B) Due to its double-stranded structure.
C) Because it exists in the cytoplasm. D) Because it does not contain phosphate.
61. What might happen if there were no RNA in the cell?
A) Protein synthesis will stop despite the presence of DNA.
B) Proteins will continue to be synthesized normally.
C) The number of nucleotides in the DNA will increase.
D) DNA will become capable of producing energy directly.
62. If we assume that some of the nucleotide components can be used in synthesizing ATP molecules from ADP molecules, how many ATP molecules may be produced from the breakdown of 5 nucleotides?
a. 1. b. 2. c. 5. d. 7.
63. CRISPR-Cas9 technology is described as a
A) light microscope. B) digestive enzyme. C) diet system. D) high-precision molecular scissor

64. The "Genetic Code" results from the difference in
 A) the sequence of nitrogenous bases. B) the type of sugar only.
 C) the number of phosphate groups. D) the sequence of amino acids.
65. A practical application resulting from using the electron microscope to study cell membranes is
 A) Designing drugs that target specific proteins inside the cell.
 B) Improving the ability of organisms to produce energy.
 C) Increasing the rate of cell division. D) Reducing the need for lipids in membranes
66. Advances in electron microscopy technology have helped in
 A) converting sugar into fats. B) increasing body weight.
 C) understanding how molecules are arranged inside the cell. D) cooling the cell.
67. The higher plants are able to transfer water over long distances, despite the absence of a specialized organ, because.....
 a) they depend on gravity to push water
 b) Specialized transport systems and physical mechanisms are present
 c) Each plant cell absorbs water that is directly needed from the environment
 d) Roots push water effectively to other parts
68. If the leaves of a pine tree are coated with a waxy substance that blocks the stomata, the first process to stop will be.....
 A) Lignin production B) Upward movement of water to the leaves
 C) Water flow in the phloem D) Food storage
69. The Cohesion-Adhesion theory depends primarily on the properties of ...
 A) Water molecules B) Food molecules C) Oxygen D) Carbon dioxide
70. Damage to the phloem in a tree leads to
 A) Roots drying out due to lack of water B) Death of roots due to lack of food supply
 C) Increased salt absorption D) Stopping of transpiration
71. The primary function of xylem tissue in plants is to transport
 A) Products of photosynthesis B) Oxygen C) Water and minerals D) Energy
72. The appearance of air bubbles inside xylem vessels causes
 A) Increased transpiration rate B) Increased speed of water ascent
 C) Salt accumulation in leaves D) Obstruction of the water column movement upwards
73. During summer ,why does the process of transpiration become more important for the plant?
 A) Because it helps cool the leaves B) Because it increases sugar storage
 C) Because it reduces salt absorption D) Because it stops photosynthesis
74. Storing sugars in roots during winter and transporting them to leaves in spring proves that transport in the phloem

Lesson 2:

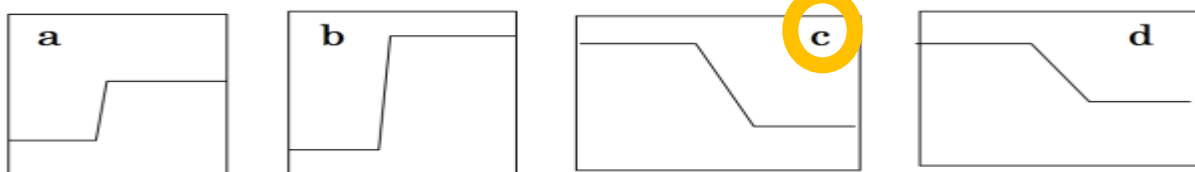
- A) Depends on gravity
C) Occurs from bottom to top only
- 75. Which of the following agricultural applications benefits most from Micro-CT results?**
A) Improving protein productivity
C) Developing drought resistance strategies
B) Increasing cellular respiration rate
D) Enhancing chlorophyll formation
- 76. Modern technologies, such as Micro-CT Scanning (Micro-X-ray Computed Tomography), are used to.....**
A) Accurately image water and food transport mechanisms
c) Increase growth rate
B) Kill pests
D) Stimulate respiration
- 77. The system responsible for transporting oxygen and nutrients in the human body is the**
A) Respiratory system **B) Circulatory system** C) Excretory system D) Digestive system
- 78. In the human circulatory system, digested nutrients are transported to the cells via the:**
A) Capillaries **B) Arteries** C) Veins D) Heart
- 79. Blood viscosity, as a physical property, mainly depends on**
A) affects the effort required to pump the blood **B) Concentration of protein and red blood cells**
C) Oxygen percentage D) Adhesion force
- 80. The pulmonary circulation begins with**
A) Oxygenated blood from the left ventricle **B) Deoxygenated blood from the right ventricle**
C) Deoxygenated blood from the left ventricle D) Oxygenated blood from the right ventricle
- 81. In which blood vessels does the actual gas exchange occur?**
A) Aorta B) Pulmonary artery C) Pulmonary veins **D) Blood capillaries**
- 82. Which of the following statements explains the relationship between transport in plants and transport in humans?**
A) Both occur in only one direction
B) Both aim to distribute materials and energy within the body
C) Both rely on lignin D) Both rely on the process of transpiration
- 83. A decrease in blood density leads to**
A) Increased blood pressure B) Cardiac stopped
C) Decreased effort required to pump blood D) Oxygen accumulation
- 84. Which of the following factors leads to an "increase" in arterial blood pressure?**
A) Increased resistance of arterial walls
C) Decrease in blood volume B) widening of blood vessels
D) Slow heart rate
- 85. Blood pressure in the arteries is at its highest level during**
A) Ventricular diastole (relaxation) B) Sleep
C) When blood reaches the veins **D) Ventricular systole (contraction)**
- 86. The renal denervation technique is a physical application used to treat**
A) Shortness of breath B) Diabetes mellitus
C) Visual weakness D) High blood pressure

87. The relationship between the processes of respiration and photosynthesis is that:
 a) The products of respiration are reactants for photosynthesis
 b) Both occur in the mitochondria
 c) Both require sunlight
 d) Both occur in all organisms
88. Which of the following is an example of active transport in a cell?
 A) Oxygen passing across the membrane
 B) Water moving by osmosis
 C) Transport of ions against their concentration gradient in root cells
 D) Diffusion of gases from the lungs into the blood
89. Aerobic cellular respiration in cells produces:
 A) Carbon dioxide, water, and energy
 B) Alcohol and energy
 C) Lactic acid only
 D) Energy without other products
90. If a substance is innovated to increase the efficiency of oxygen transport to the mitochondria, it is expected to
 A) Increase lactic acid fermentation
 B) Aerobic respiration switches to anaerobic respiration
 C) Increase the efficient in energy production
 D) Stop ATP production
91. Anaerobic respiration in human muscles during strenuous exercise results in the accumulation of
 A) Ethyl alcohol
 B) Glucose
 C) Glycogen
 D) Lactic acid
92. Anaerobic fermentation in yeast cells produces
 A) Oxygen
 B) Water only
 C) Lactic acid
 D) Ethanol
93. Which of the following is considered an exothermic reaction?
 A) Glucose synthesis in photosynthesis
 B) Glucose breakdown in aerobic respiration
 C) Formation of ATP from ADP
 D) All of the above
94. Which of the following processes is responsible for converting potential energy in food into active energy?
 A) Transport
 B) Respiration
 C) Excretion
 D) Photosynthesis
95. Anaerobic respiration occurs within the cell inside the.....
 A) Cytoplasm
 B) Mitochondria
 C) Nucleus
 D) Sap vacuole
96. The accumulation of lactic acid in muscles leads to
 A) Products of photosynthesis
 B) Feeling of muscle fatigue(tired)
 C) decreases in water and minerals
 D) Increased muscle activity
97. Why is aerobic respiration considered more efficient than anaerobic respiration?
 A) Because it produces CO_2
 B) Because it occurs only in the cytoplasm
 C) Because it produces a larger amount of energy (ATP)
 D) Because it does not require enzymes
98. If the enthalpy of the reactants is 2584 kJ and that of the products is 5642 kJ, then this reaction is
 a- Exothermic, with ΔH negative
 b- Endothermic, with ΔH negative
 c- Exothermic, with ΔH positive
 d-Endothermic, with ΔH positive

99. From the equation: $2C_{(s)} + 2H_{2(g)} + 52.3 \text{ kJ} \rightarrow C_{2}H_{4(g)}$, It can be concluded that.....

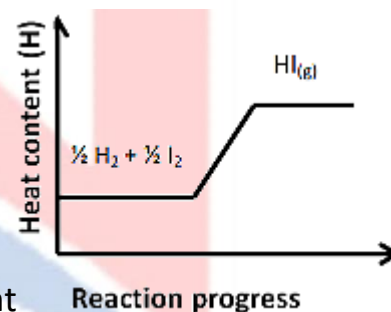
- a- the medium acquires heat. b- heat transfers from the surrounding medium to the system. c- the system loses heat. d- heat transfers from the system to the surrounding medium

100. Which graph represented a reaction produces largest amount of energy (heat) to the surrounding medium?



101. Which of the following best describe the heat change of this reaction?

- a) Sum of heat content of products (H_p) is greater than of sum of heat content of reactants (H_R) and sign of ΔH is positive.
 b) Sum of heat content of products (H_p) is less than of sum of heat content of reactants (H_R) and sign of ΔH is positive.
 c) Sum of heat content of products (H_p) is less than of sum of heat content of reactants (H_R) and sign of ΔH is negative.
 d) Sum of heat content of products (H_p) is greater than of sum of heat content of reactants (H_R) and sign of ΔH is negative.



102. From the following equation: $H_2O_{(l)} \rightleftharpoons H_2O_{(g)}$, $\Delta H = +44 \text{ kJ/mol}$,

- a) heat content of water vapour > heat content of liquid water
 b) heat content of water vapour = half heat content of liquid water
 c) heat content of water vapour < heat content of liquid water
 d) heat content of water vapour = heat content of liquid water

103. The following equation represents the dissociation reaction (electrolysis) of water:

$2H_2O \rightarrow 2H_{2(g)} + O_{2(g)}$, $\Delta H = +571.8 \text{ kJ}$. From this equation, it is clear that the process of forming a mole of water from its primary elements under standard conditions is an.....

- a) exothermic process which releases an amount of heat equal to 571.8 kJ/mol
 b) exothermic process which releases an amount of heat equal to 285.9 kJ/mol
 c) endothermic process which absorbs an amount of heat equal to 571.8 kJ/mol
 d) endothermic process which absorbs an amount of heat equal to 285.9 kJ/mol

104. If ΔH for the reaction = + 200 kJ, then...

- a) The system releases heat b) The surrounding medium gain heat
 c) The system gains heat d) ΔH is negative

105. Why must a chemical equation be balanced when calculating enthalpy change ?

- a- To achieve the law of conservation of energy.
 b- To achieve the law of conservation of mass

- c- To keep the temperature constant
- d- To determine the type of reaction (endothermic/exothermic).

106. In an exothermic reaction

- a- The energy stored in the products is less than the energy stored in the reactants.
- b- The energy stored in the reactants is less than the energy stored in the products.
- c- The surrounding medium lose heat
- d- The system gains heat.

107. Which of the following equations represents an exothermic reaction ?

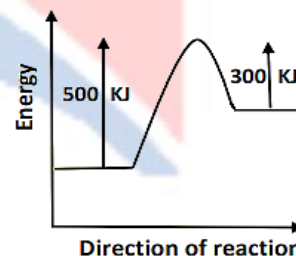
- a- $XY_5 \rightarrow XY_3 + Y_2$, $\Delta H = +420 \text{ KJ}$
- b- $XY_5 \rightarrow XY_3 + Y_2 + 420 \text{ KJ}$
- c- $XY_5 \rightarrow XY_3 + Y_2 - 420 \text{ KJ}$
- d- $XY_5 + 420 \text{ KJ} \rightarrow XY_3 + Y_2$

108. Equal amounts of four different substances (A, B, C & D) were added separately to equal amounts of an acid and a thermometer placed in each mixture. For which mixture is the reaction the most exothermic?

- A. mixture (A) temperature rises by 3°C
- B. mixture (B) temperature rises by 5°C
- C. mixture (C) temperature falls by 3°C
- D. mixture (D) temperature falls by 5°C

109. From the opposite diagram of energy, the value of $\Delta H = \dots$

- A) + 200 KJ
- B) - 200 KJ
- C) + 300 KJ
- D) - 300 KJ



110. Which process is considered an exothermic system:

- A-freezing
- b-evaporation
- c-melting
- d-heating water

111. Which of the following biological processes represents an example of an endothermic (energy-absorbing) reaction?

- a- Cellular respiration
- b- Formation of water molecules
- c- Decomposition of potassium chloride
- d- Photosynthesis

112. Which of the following biological processes represents an example of an endothermic (energy-absorbing) reaction?

- a- Cellular respiration
- b- Formation of water molecules
- c- Decomposition of potassium chloride
- d- Photosynthesis

113. The mass of one mole of water equal.....

114. Heat content of water is the sum amount of stored energy in(H = 1, O = 16)

- A- 1 L
- B- 18 g
- C- 22.4 L
- D- 1 Kg

115. The number of moles in 180 g of acetic acid (CH_3COOH) = ... (C = 12, H = 1, O = 16)

- A- 1 mol
- B- 2 mol
- C- 3 mol
- D- 4 mol

116. In the reaction: $2\text{H}_2\text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g}) + \text{O}_2(\text{g})$, $\Delta H = -196 \text{ kJ/mol}$, what is the change in heat of the decomposition of 0.34 g of hydrogen peroxide H_2O_2 (H = 1, O = 16) ?

- a- - 0.98 kJ
- b- - 1.96 kJ
- c- - 196 kJ
- d- - 98 kJ

117. using the chemical equation: $\text{H}_2\text{O}(\text{v}) \rightarrow \text{H}_2\text{O}(\text{g})$, $\Delta H = -44 \text{ K.J}$ Then heat change (ΔH) for condensation 2 mole of water =.....K.J

- a) -88 K.J
- b) +88 K.J
- c) -44 K.J
- d) + 44 K.J

118. From the combustion equation of the hydrocarbon $\text{C}_2\text{H}_4 + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 2\text{H}_2\text{O} + 955 \text{ kJ}$ (C = 12, H = 1) If 84 grams of the hydrocarbon are completely burned, then

- a) The surrounding medium gains 955 KJ of energy
 b) The surrounding medium loses 2865 KJ of energy
 c) The reactants lost 2865 KJ of energy d) The surrounding medium gains 1910 KJ of energy

119. By using the following equation of burning of octane : $2\text{C}_8\text{H}_{18(l)} + 25\text{O}_{2(g)} \rightarrow 16\text{CO}_{2(g)} + 18\text{H}_2\text{O}_{(g)} + 10900 \text{ KJ}$ Then the change in (ΔH) enthalpy when 4 moles are resulted from CO_2 equal ...

- A- -5450 KJ B- +5450 KJ C- +2725 KJ D- -2725 KJ

120. If the heat enthalpy of reactant (HR) is 1250 KJ and enthalpy of product (HP) 1720 KJ then

- A- The reaction is endothermic , $\Delta H = +470 \text{ KJ}$ B- The reaction is exothermic , $\Delta H = -470 \text{ KJ}$ C- The reaction is exothermic, $\Delta H = +470 \text{ KJ}$ D- The reaction is endothermic, $\Delta H = -470 \text{ KJ}$

121. In the cellular respiration experiment using seeds, it was observed that the limewater in flask (A) (at room temperature) turned cloudy faster than in flask (B) (in the refrigerator). How can this difference be analyzed?

- A. The rate of oxygen production is higher in flask (A).
 B. The rate of carbon dioxide consumption is higher in flask (B) .
 C. The rate of cellular respiration (CO_2 production) is higher in flask (A)
 D. The seeds in flask (B) died due to extreme cold

Lesson 3:

122. Body toxicity increases when:

- A) The respiration rate decreases B) Metabolic waste accumulates
 C) Sweat secretion increases D) Blood pressure decreases

123. Which of the following illustrates the dual nature of metabolism?

- A) Muscle contraction and relaxation B) Inhalation and exhalation
 C) Nerve impulse transmission D) Protein synthesis and glucose breakdown

124. Which of the following shows the importance of excretion in homeostasis?

- A) Preventing accumulation of harmful by-products B) Maintaining stable blood glucose levels
 C) Ensuring oxygen delivery to tissues D) Regulating nerve impulse speed

125. The accumulation of metabolic wastes directly leads to.....

- a) Increase rate of catabolism b) Decrease in temperature
 c) Increase efficiency of cells d) Disturbance of the chemical balance of fluids

126. Metabolism is a process of

- a) Catabolism only b) Anabolism only c) Both catabolism and anabolism d) Excretion only

127. The relationship between "catabolism" and metabolic waste products is

- a) Direct; increased catabolism increases waste products
 b) Inverse; catabolism reduces waste products
 c) constant; unaffected by activity
 d) Metabolic waste products are limited to the products of anabolism only

- 128.** Which of the following organs is considered the primary organ responsible for removing nitrogenous waste from the blood?
 A) The Liver B) The Skin **C) The Kidneys** D) The Lungs
- 129.** When the salts in the blood increase, the kidneys respond by:
 A) Secreting more Sweat **B) Increasing the reabsorption of water**
 C) Increasing the excretion of water D) Storing salts
- 130.** If the kidneys fail to perform their function, the first thing to be affected is:
 A) Oxygen level **B) The percentage of waste in the blood**
 C) The number of blood cells D) Hormone production
- 131.** What is the main function of reabsorption in the kidneys ?
 A) Removing wastes from the blood **B) Recovering useful substances such as glucose** C)
 Storing urine D) Converting ammonia into urea
- 132.** Urine moves from the kidney to the bladder through
A) Ureters B) Urethra C) Nephron D) Blood vessels
- 133.** When there is a disturbance in ion concentration inside the body, delicate vital processes such as are affected
 A) Hair growth **B) Nerve and muscle function** C) Skin color D) Liver size
- 134.** Which of the following organ contribute to regulating both body temperature and salts?
 a) Salivary glands b) Endocrine glands c) liver **d) Skin**
- 135.** The layer that contains sweat glands and hair follicles is
A) Dermis B) Epidermis C) Hypodermis D) Outer membrane
- 136.** When examining a urine sample from a patient, it was found to contain large amounts of glucose. This may indicate a defect in the process of
 a) Filtration b) Storage of urine **c) Reabsorption** d) Excretion
- 137.** An increase in the concentration of sodium ions in the blood directly affects
 a) Rate of breathing **b) Kidneys activity**
 c) Production of skin pigment d) Breakdown of hemoglobin
- 138.** Which of the following choices in the table represents the amount of water lost from the body on a hot day?

	Decreasing the lost amount of water from	Increasing the lost amount of water from
(a)	Skin	Kidneys
(b)	Kidneys	Lungs
(c)	Kidneys	Skin
(d)	Skin ¹⁵	Lungs

- 139. Evaporation of sweat from the skin surface helps**
 A) raise body temperature B) increase blood viscosity
 C) absorb oxygen **D) decrease body temperature**
- 140. The skin has an immune function because it contains**
A) Epidermis B) Dermis C) Hypodermis D) Blood capillaries
- 141. The activity of sweat glands is directly proportional to**
 A) the amount of proteins consumed B) Kidney size
 C) decrease in breathing rate **D) increase in surrounding temperature**
- 142. The subcutaneous layer functions as.....**
 a) A barrier against microbes b) A filter for blood
c) A thermal insulator due to its fat content d) A producer of sweat
- 143. The breakdown of hemoglobin resulting from the destruction of old red blood cells produces the substance**
 a) Ammonia b) Urea c) Uric acid **d) Bilirubin**
- 144. The body gets rid of bilirubin by excreting it with.....**
 a) sweat b) urine **c) feces** d) exhaled air
- 145. Ammonia is a waste product resulting from the breakdown of**
 a) Starch **b) Amino acids** c) Fats d) Glucose
- 146. The accumulation of bilirubin in the body leads to**
a) Jaundice b) Bile c) Asthma d) Dehydration
- 147. Which excretory organ would be most affected when consuming foods containing dyes?**
 a) Lungs **b) Liver** c) Bladder d) Skin
- 148. The relationship between the liver and kidney in dealing with proteins is ...**
 A) The kidney breaks down proteins and the liver expels them
B) The liver converts ammonia into urea and the kidney excretes it
 C) Both absorb proteins D) No relationship
- 149. Bile helps in the disposal of**
 A) Glucose B) Oxygen **C) Excess cholesterol** D) Urea
- 150. Ammonia in the liver is converted into**
 A) Bilirubin B) Glucose **C) Urea** D) Uric acid

- 151.** Increased blood acidity caused by CO_2 negatively affects ...
 A) Enzyme activity B) Bones C) Skin D) Hair
- 152.** which of the following metabolic waste it's accumulation increases blood acidity?
 a) Carbon dioxide b) Mineral salt c) Urea d) Ammonia
- 153.** What is the common role between the skin and the kidneys in Homeostasis?
 A) Hormone production B) Waste storage
 C) Excretion of water and salts D) Energy production
- 154.** Artificial kidney membranes prevent proteins from passing because of?
 A) their electrical charge B) the large size of their molecules
 C) their high speed D) the viscosity of the cleaning fluid
- 155.** Thermal radiation can be measured by...
 a) ultraviolet rays b) Sound waves c) Infrared rays d) Ultrasound waves
- 156.** The bioartificial kidney differs from traditional dialysis machines in its ability to
 A) remove excess water B) eliminate urea
 C) simulate biochemical functions D) cool the blood
- 157.** The process that "pulls" carbon from the atmosphere is
 a) respiration b) combustion c) photosynthesis d) decomposition
- 158.** Using Infrared Thermography to measure skin temperature is a measurement of
 A) nuclear energy B) soil nitrates
 C) energy lost in the process of thermal balance D) sound waves
- 159.** The property that helps reveal the texture of an organ is
 A) wave scattering B) regular reflection C) constant sound speed D) tissue viscosity
- 160.** The diagnosis that does not require surgery thanks to Ultrasound is ...
 A) kidney transplantation B) heart valve replacement ?
 C) cell engineering D) detection of stones and inflammations
- 161.** The boundaries in Ultrasound mean the transition from
 A) liquid to gas only B) carbon to phosphorus
 C) bacteria to nitrates D) one medium with acoustic impedance to another medium
- 162.** Ultrasound devices used for imaging organs rely on sound properties such as
 a) evaporation and transpiration b) weathering and deposition
 c) fixation and denitrification d) reflection and refraction

- 163.** Ultrasound waves of high frequency are specifically used because they
 a) kill bacteria
 b) heat tissues
 c) provide high resolution for imaging small details
 d) travel faster than light
- 164.** The strength of ultrasound wave reflection depends on
 a) the acoustic impedance of the tissue
 b) the color of the organ
 c) its temperature
 d) the amount of urea in the blood
- 165.** The role of factories in the carbon cycle is
 a) absorbing carbon
 b) releasing carbon oxides
 c) fixing nitrogen
 d) recycling proteins
- 166.** Carbon moves from plants to animals through
 a) respiration
 b) evaporation
 c) decomposition
 d) feeding
- 167.** Carbon returns to the atmosphere from living organisms through two processes ...
 A) photosynthesis and transpiration
 B) weathering and deposition
 C) respiration and decomposition
 D) fixation and denitrification
- 168.** Lightning contributes to
 A) decomposition
 B) fixation of atmospheric nitrogen
 C) respiration
 D) phosphate deposition
- 169.** Increasing the amount of urea in soil leads to
 A) increased nitrates available to plants
 B) decreased rate of photosynthesis
 C) accumulation of carbon dioxide in the atmosphere
 D) stoppage of the carbon cycle
- 170.** Which of the following reflects a disruption in the nitrogen cycle due to human activity?
 A) planting diverse crops
 B) crop rotation
 C) excessive use of chemical fertilizers
 D) presence of nitrifying bacteria in soil
- 171.** Farmers rely on planting legumes to improve soil fertility because they ...
 a) consume small amounts of nitrogen
 b) produce more proteins than other plants
 c) prevent nitrification
 d) contain bacteria that fix nitrogen in their roots
- 172.** During the nitrogen cycle in nature, which of the following living organisms act on fixing the atmospheric nitrogen?
 a) Green plants.
 b) Mushroom fungus.
 C) Nodular bacteria.
 D) Herbivores
- 173.** The decomposition of urea in soil by bacteria produces
 a) ammonia and then nitrates absorbed by plants
 b) oxygen gas
 c) rock phosphates
 d) sound echoes

174. Eliminating nitrogen-fixing bacteria in the soil leads to

- a) increased protein production in plants b) increased rate of cellular respiration
c) accumulation of nitrogen gas in the atmosphere d) decreased soil fertility

175. The process that releases phosphorus from rocks is called

- a) Respiration b) Evaporation c) Weathering d) Nitrification

176. The phosphorus cycle differs from the carbon and nitrogen cycles in that

- a) the atmosphere is not part of it b) it does not require decomposers
c) it is very fast d) it occurs in outer space

177. Excretion is not merely the elimination of toxins, but rather

- A) a means of gaining weight B) a purely physical process
C) a source of solar energy D) an important link in the continuation of element cycles

178. Without decomposer organisms, the element cycles

- A) stop B) accelerate C) become gaseous only D) depend on the artificial kidney

179. Excretion processes and natural cycles together ensure

- A) depletion of resources B) the survival and sustainability of life in the biosphere
C) the cessation of sound waves D) the freezing of the Earth

180. Which of the following reflects the importance of excretion in ecological balance?

- a) Accumulation of wastes without decomposition b) Cessation of carbon dioxide excretion
c) Decomposition of urea into ammonia in the soil d) Absence of decomposer bacteria.

181. The basic structural units of the nervous system are called :

- A) Neurons B) Peripheral nerves C) Nephrons D) Cerebral lobes

182. The basic "receptive unit" in the complex neural network is :

- a) Dendrites b) Axon c) Nerve endings d) Synaptic cleft

183. What is the function of dendrites in a neuron?

- a) Communicating with muscles and glands to give commands.
b) Containing the nucleus and essential organelles of the cell.
c) Receiving nerve signals from other cells.
d) Transmitting the nerve signal away from the cell body

184. The peripheral nervous system includes.....

- a) sensory neurons and brain. B) spinal cord and motor neurons
c) all nerves throughout the body. D) brain and spinal cord

Lesson 4:

- 185.** The nerve cell is considered the fundamental unit in the formation of the nervous system, and its basic function is:
 A) Hormone production **B) Nerve impulse transmission** C) Energy storage D) Body defense
- 186.** Which of the following statements explains why the Sodium-Potassium pump requires energy?
 A) Because it moves ions down the concentration gradient
 B) Because it moves ions against the concentration gradient
C) Because it does not depend on ATP D) Because it only works during sleep
- 187.** During depolarization, the membrane potential:
 A) Stays constant at -70 mV B) Becomes more negative
C) Changes from negative to positive D) Does not change
- 188.** The "Repolarization" phase shows the outer surface returning to a positive state due to :
a) Stopping Sodium input and opening Potassium channels for output
 b) More Sodium input
 c) Rupture of Synaptic vesicles d) Movement of the nucleus within the cell body
- 189.** During depolarization, charges are reversed because :
 a) Negative proteins move exit the cell b) The nucleus stops its activity
 c) The Sodium pump stops working completely **d) positive Na^+ move in exceeds move out K^+**
- 190.** During the refractory period, Sodium channels are:
A) Unable to respond to a new stimulus B) Completely open
 C) Pumping Potassium D) Disappeared
- 191.** The potential difference reaching (+40 mV) means that :
 A) The cell lost its ability to sense **B) Sodium ions have flowed inward in large quantities**
 C) The enzyme that breaks down acetylcholine has started working
 D) The cell is in a state of complete rest
- 192.** Which of the following represents the state of polarization?
 A) High permeability of Sodium into the cell B) Opening of Calcium channels
C) Accumulation of positive charges outside the membrane and negative charges inside
 D) Constriction of synaptic vesicles
- 193.** What is the correct ratio of ion exchange across the Sodium-Potassium pump per ATP molecule?
A) 3 Sodium ions out versus 2 Potassium ions in B) 2 Sodium ions out versus 3 Potassium ions in
 C) 1 Sodium ion out versus 1 Potassium ion in D) 3 Potassium ions out versus 2 Sodium ions in

194. Which of the following choices in the table represents the correct numbers of sodium and potassium ions exchanged through the sodium-potassium pump and the number of ATP molecules required for this exchange?

	The number of sodium ions that exit from the cell	The number of potassium ions that enter the cell	The number of ATP molecules consumed
(a)	22	66	42
(b)	44	22	66
(c)	66	44	22
(d)	44	66	22

195. The nerve impulse travels along the axon through :

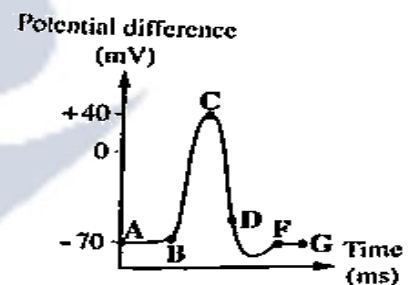
- A) Continuous electrical flow
B) A successive series of depolarization and repolarization processes
 C) Movement of vesicles inside the axon
 D) Vibration of the sheath surrounding the axon

196. During repolarization, what happens?

- A) Sodium ions enter the cell
B) Potassium ions exit the cell
 C) The sodium-potassium pump stops
 D) The positive potential inside the cell increases

197. The opposite graph shows the changes experienced by a neuron exposed to a stimulus. During which stage would you expect that a new nerve impulse is generated, if another stronger stimulus affects the neuron?

- a) From (A) to (B).
 b) From (B) to (C).
 c) From (C) to (D).
d) From (F) to (G).



198. The period during which a new nerve impulse cannot be generated is called:

- A) Depolarization
 B) Repolarization
C) Refractory period
 D) Resting potential

199. What explains the importance of the resting potential in a nerve cell?

- A) It prevents the cell from responding
B) It keeps the membrane ready to transmit the impulse when a stimulus occurs
 C) It increases the number of synapses
 D) It decreases the membrane permeability to water

200. The binding of a neurotransmitter to receptors leads to

- A) Closing Sodium channels in the post-synaptic cell
 B) Constriction of the synaptic knob

C) Generating a new nerve impulse in the post-synaptic cell

D) Return of the impulse to the pre-synaptic cell

201. Calcium ions The “mechanical Factor” in the synaptic area act as :

A) A Chemical neurotransmitter B) An insulating material for the synaptic cleft

C) An enzyme to break down acetylcholine

D) A substance that release chemical transmitters from vesicles

202. The primary function of the enzyme that breaks down acetylcholine is : ?

A) Stimulating the cell

B) Transporting Sodium

C) Returning the cell to the resting state

D) Synthesizing acetylcholine

203. The nerve impulse is transmitted across the synaptic cleft by :

A) Active transport of Sodium

B) Water movement between the two cells

C) Direct electrical jumping

D) Chemical substances

204. Chemical neurotransmitters are stored inside :

A) Receptors

B) Vesicles

C) Mitochondria

D) Sodium channels

205. The minute space separating two neurons is called

A) Nerve axon

B) Synaptic knob

C) Synaptic vesicles

D) Synaptic cleft

206. The presence of “receptors” only on the post-synaptic membrane explains :

a) The strength of the nerve impulse

b) The transmission of the impulse in one direction c)

The large size of the synaptic cleft

d) The breakdown of acetylcholine

207. If a substance that blocks calcium channels in the nerve endings is injected, the result will be;

a) Increased impulse speed

b) Complete cessation of signal transmission between cells

c) Transformation of the nerve impulse into a light signal

d) Spontaneous rupture of synaptic vesicles

208. Which of the following occurs immediately after the nerve impulse reaches the terminal knobs (buttons)?

A) Calcium exits the cell

B) Calcium enters and vesicles fuse with the membrane

C) Sodium channels close

D) Neurotransmitter breakdown

209. The Purkinje cell, which can receive hundreds of thousands of synapses, demonstrates that:

A) The nervous system is slow to respond

B) Nerve cells function independently

C) The nervous system is an interconnected network that transmits information quickly and accurately

D) Synapses are few in the brain

210. The difference between a regular neuron and a Purkinje cell lies in :

- a) The type of ions used
- b) The presence of a nucleus
- c) The number of neural synapses
- d) The method of impulse transmission along the axon

211. Electrical impulses in the NCV (Nerve Conduction Velocity) test resemble :

- A) Heartbeats
- B) The breathing process
- C) The natural nerve impulse inside the body
- D) Blood flow in the veins

212. performing the NCV (Nerve Conduction Velocity) test in a “non-invasively” manner (over the skin) makes it

- a) Safe and easy for assessing nerve functions
- b) Inaccurate
- c) Limited to the brain only
- d) Requiring general anesthesia

213. If an NCV (Nerve Conduction Velocity) test shows extreme slowness in signal transmission, the physician may conclude:

- a) An increase in Purkinje cells
- b) Superior speed in information processing
- c) A decrease in CO₂ levels
- d) Nerve disorder or damage

214. The nerve impulse passing from nerve cell (X) to muscular cell (Y) is transmitted through.....

- a) the dendrites of cell (X).
- b) the nerve endings of cell (Y)
- d) the interneurons.
- c) the synaptic region between the two neurons

215. Which of the following represents the most accurate explanation of the term "Nanotechnology"?

- a) The study of dwarfs in ancient Greek times
- b) The practical application of knowledge to control materials at the nanoscale
- c) Measuring the lengths of materials using the traditional meter
- d) The study of large molecules in their normal state

Lesson 5:

216. If you know that the hydrogen atom is the smallest known atom, which of the following represents its approximate radius?

- a) 0.05 nm.
- B) 60.15 nm.
- C) 0.25 nm.
- D) 0.35 nm

217. You have a material with dimensions (20 nm, 50 nm, 200 nm). This material is classified as...

- a) zero-dimensional nanomaterial.
- B) two-dimensional nanomaterial
- c) one-dimensional nanomaterial.
- D) three-dimensional nanomaterial

218. If the number of atoms exposed for reaction on the surface of a nanomaterial increases, this leads to

- A) chemical inactivity
- B) a massive increase in chemical activity
- C) transformation of matter into gas
- D) increase in melting point

- 219.** "Nano chemistry" is concerned with studying changes in properties at a small scale. Which of the following falls within its interests?
 A) Manufacturing massive devices B) Studying planetary motion
 C) Uranium decay **D) Manufacturing and describing nanomaterials in their various forms.**
- 220.** Which of the following properties does not typically change when matter is reduced to the nanoscale?
 a) Electrical conductivity b) Color c) Melting point **d) Atomic mass of the element itself**
- 221.** The change in material properties at the nanoscale is due to two main factors, which are
 a) color and hardness
b) increase in the ratio of surface area to volume and quantum effects
 c) melting point and electrical conductivity d) atomic size and electron speed
- 222.** Which of the following materials can be used as thin films?
a) Graphene b) Gold nanoparticles c) Porous materials d) Nanowires
- 223.** "Three-dimensional nanomaterials don't possess any nanoscale properties." How accurate is this statement?
a) False, because they contain internal nanostructures.
 b) True, because they have large dimensions.
 c) True, because they can be seen with the naked eye.
 d) False, because they must be in the gaseous state
- 224.** Nanotechnology contributes to biosphere sustainability because it:
 A) Relies on polluting materials. **B) Reduces the consumption of energy and resources.**
 C) Produces toxic waste. D) Uses fossil fuel.
- 225.** Why is nanotechnology considered a revolution in human interaction with the biosphere? a)
 Because it increases the size of cells to be seen by the naked eye
 b) Because it eliminates the need to study traditional chemistry
 c) Because it relies only on radiation for treatment
d) Due to its ability to observe and control matter at the level of atoms and molecules
- 226.** When the size of gold is reduced to the nanoscale, its color changes because:
 A) The number of electrons in its atoms decreases. **B) Its interaction with light changes.**
 C) Its density increases D) It loses its metallic properties
- 227.** When matter is fragmented, the relationship between surface area and volume shows that:
A) The volume is unchanged and the surface area increases.
 B) Both the volume and surface area decrease.

- C) The volume decreases and the surface area does not change.
D) Neither the volume nor the surface area is affected

228. Two-dimensional nanomaterials have.....

- a) Two dimensions outside the nanoscale and one nanoscale dimension.
b) Two dimensions inside the nanoscale and one non-nanoscale dimension.
c) Two dimensions outside the nanoscale and an internal porous structure.
d) Two dimensions inside the nanoscale and an internal nanostructure

229. Thin films appear as examples of.....materials

- A) One-dimensional Nanomaterials B) Three-dimensional Nanomaterials
C) Zero-dimensional Nanomaterials D) Two-dimensional Nanomaterials

230. A patient suffers from severed motor nerve; which of the following nanomaterials is most suitable to be used as a bridge for nerve impulse transmission?

- a) Thin films. B) Quantum dots. C) Porous materials. D) Nanowires.

231. "Nanocomposites" are an example of materials

- A) 1(D) B) 2(D) C) 3(D) D) 0(D)

232. Which type of nanomaterials is best suited for manufacturing "micro- filters "for water?

- A) 3D porous nanomaterials B) 0D nanomaterial C) 2D thin film D) Quantum dots

233. Buckyballs are useful in medicine because they:

- A) Are resistant to heat. B) Contain rare minerals. C) Can carry drugs inside them. D) Absorb light.

234. In drug delivery using nanotechnology, nanoparticles help to:

- A) Spread the drug throughout the whole body. B) Increase the drug dosage.
C) Deliver the drug directly to the infected cells. D) Prevent its absorption

235. The primary benefit of enclosing a cancer drug with nanoparticles is

- A) increasing the drug's size for easier swallowing B) changing the drug's taste
C) reducing effectiveness for safety D) targeting cancerous cells only

236. Which of the following materials is most effective for creating a nanobridge between the two ends of a severed nerve?

- A) Quantum dots B) Flat graphene C) Carbon nanotubes D) Water molecule

237. Which of the following statements is correct about the different methods of cancer treatment?

- a) Conventional treatment exposes the body's cells to the toxic drug substance.
b) Side effects of treatment with nanotechnology and radiation together are very low.

- c) Using nanotechnology increases the need for radiation doses.
 d) Chemotherapy can only be used after the failure of treatment with nanotechnology.

238. The function of biofuel cells is similar to the process of cellular respiration in that both:

- A) Produce energy from the oxidation of glucose. B) Consume ATP molecules.
 C) Store energy. D) Depend in their function on solar energy.

239. In a biofuel cell, glucose is oxidized at

- a) the positive electrode (cathode) b) inside the wires only
 c) in the light lamp d) negative electrode (anode)

240. The operating principle of Biofuel Cells is inspired by

- a) wood combustion b) wave movement c) cellular respiration d) solar energy

241. The primary fuel used in biofuel cells is

- A) Gasoline B) External hydrogen gas C) Glucose D) Nano coal

242. Electrons in a biofuel cell move through an external circuit toward the

- A) Cathode B) Anode C) Human body D) Ground

243. The role of "carbon nanotubes" in biofuel cells is

- A) storing glucose B) coating the electrodes to increase surface area
 C) preventing protons from reaching the cathode D) cooling the medical device

244. Which of the following organelles in a living cell performs a function similar of the positive electrode in consuming oxygen and protons to produce water?

- A) Mitochondria B) Vacuole C) Nucleus D) Cell wall

245. The movement of smart prosthetics limbs depends on.....

- A) Nano-chip commands B) large external batteries
 C) wind movement D) automatic muscle response

**Unit 4:
Lesson 1:**

246. All of the following are from Earth's layers, except the.....

- a) Earth's crust. B) troposphere. C) mantle. D) core

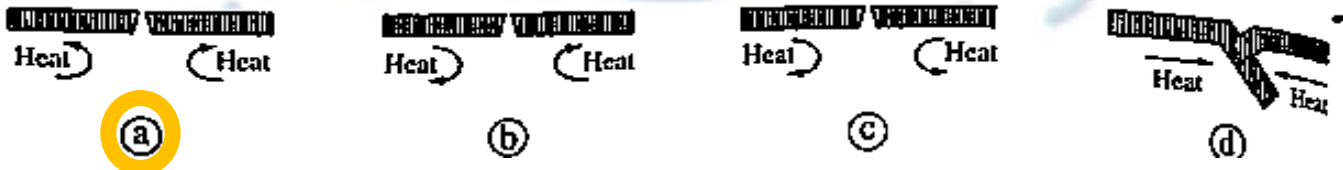
247. Which of Earth's layers accounts for only 1% of the planet's total volume?

- a) Mantle b) Core c) Crust d) Lithosphere

248. Which of the following elements contributes to making the oceanic crust denser than the continental crust ?

- a) Magnesium and Iron b) Aluminum and Silica
 c) Sodium and Potassium d) Hydrogen and Helium

- 249. The largest of Earth's layers by mass (representing 67% of Earth's mass) is**
 A) The Crust **B) The Mantle** C) The Outer Core D) The Inner Core
- 250. Why does the inner core remain solid despite extreme temperatures?**
 a) Due to sudden cooling b) Because it contains nickel
 c) Because of its far distance from the surface **d) Due to immense pressure**
- 251. The Earth's magnetic field is generated by the movement of molten material in the**
 A) Lower Mantle **B) Outer Core** C) Oceanic Crust D) Upper Mantle
- 252. When comparing Earth's outer core and inner core, we find that they are:**
 a) Similar in components and physical state.
 B) Different in components and physical state
c) Similar in components and different in physical state.
 D) Different in components and similar in physical state
- 253. Which of the following industrial applications demonstrates harnessing lithosphere's properties?**
A) Using limestone in the cement industry B) Formation of organic Carbon in plants
 C) Increasing wind speed on mountains D) Absorbing Ozone in the atmosphere
- 254. The Lithosphere consists of**
 A) The Earth's crust only B) The entire mantle
C) The crust and the uppermost part of the mantle D) The inner and outer core
- 255. The average thickness of the Lithosphere is approximately**
A) 100 km B) 10 km C) 2900 km D) 6371 km
- 256. The average thickness of the Lithosphere is approximately**
 A) 100 km B) 10 km **C) 2900 km** D) 6371 km
- 257. Bicarbonate ions resulting from rock weathering eventually transform into**
 A) Emitted volcanic gases B) Concentrated acid rain
C) Calcium carbonate deposits in the seas D) Solid silicate minerals
- 258. The solubility of limestone in rainwater increases with an increase in**
 A) Temperature only **B) Pressure and CO₂ concentration**
 C) Covalent bonds in the mineral D) Surface wind speed
- 259. How does the lithosphere contribute to mitigating the phenomenon of Global Warming?**
 a) By releasing volcanic gases b) By absorbing oxygen
 c) By increasing atmospheric humidity **d) By conversing CO₂ into bicarbonates**

- 260.** The phenomenon of "Water Hardness" results from an increased concentration of which ions?
 a) Sodium and Potassium **b) Calcium and Magnesium**
 c) Iron and Nickel d) Carbonates and Bicarbonates
- 261.** The interaction of rainwater charged with CO₂ with calcite rocks leads to the formation of ...
a) Caves and cavities b) Volcanic mountains c) Igneous rocks d) Continental crust
- 262.** Why do some minerals such as feldspar and quartz remain in soil without decomposition for long periods?
a) Because they are resistant to dissolution in weak acids.
 b) Because they react with weak acids to form a protective layer.
 c) Because they are heavier than other minerals.
 d) Because they dissolve and crystallize continuously.
- 263.** Which of the following elements is primarily released from rocks due to weathering process and is used directly in building plant biomolecules?
 A) Iron **B) Potassium** C) Aluminum D) Silica
- 264.** Which of the following minerals decomposes to release potassium ions (K⁺) essential for plants?
 a) Calcite b) Phosphate **c) Feldspar** d) Quartz
- 265.** Which of the following illustrates the relationship between rock properties and the occurrence of earthquakes?
 A) Harder rocks release seismic energy quickly
B) Brittle rocks break when energy accumulates along weak faults
 C) Silica-rich rocks prevent earthquakes
 D) Carbonate rocks reduce the strength of waves
- 266.** The currents responsible for tectonic plate movement originate in the
 A) Mesosphere B) Inner Core **C) Asthenosphere** D) Continental Crust
- 267.** Which of the following figures shows the direction of convection currents that form new ocean floor?

- 268.** The plate movement that led to the formation of the Himalayas is
 A) Divergent B) Transform (Sliding) **C) Convergent** D) Lateral grinding

269. The famous "San Andreas Fault" is an example of which plate movement?

- A) Continental Convergence B) Oceanic Divergence
C) Transform (Sliding) movement D) Destructive

270. The divergence of oceanic plates (e.g., Mid-Atlantic Ridge) leads to ...

- A) The disappearance of ancient seas B) The formation of continental volcanic ranges
C) Increased thickness of the continental crust D) The formation of a new ocean floor

271. The increase in temperature as we move towards the Earth's interior is called.....

- a) Thermal equilibrium. B) Thermal pollution c) Global warming d) Thermal gradient

272. Which of the following is "NOT" among the requirements for defining a mineral geologically?

- a) Organic substance b) Regular crystalline structure
c) Naturally occurring solid substance d) Definite chemical composition

Lesson 2:

273. What is the relationship between minerals and rocks in the lithosphere?

- a) Rocks are decomposed parts of minerals.
b) Rocks and minerals are different terms for the same thing.
c) Rocks are composed of minerals bonded together.
d) Minerals are composed of small rock particles

274. Minerals contribute to maintaining Earth's stability through...

- a) Regulating global climate.
b) Supporting the rock cycle and tectonic plate movement.
c) Providing energy required for volcanoes and earthquakes.
d) Determining the paths of rivers and oceans.

275. Which of the following represents the building unit of sedimentary rocks?

- a) Organic remains. b) Tectonic plates. c) Minerals. d) Hydrocarbons

276. The hardness of quartz on the Mohs scale isapproximately

- A) 2 B) 4 C) 7 D) 10

277. The statue of Sphinx of Giza was made of Limestone rock, which has a hardness of ...

- A) 2 : 3 B) 3 : 4 C) 6 : 7 D) 7

278. The material used in making glass tools due to its resistance to scratching is ...

- A) Gypsum B) Mica C) Calcite D) Quartz

279. Which of the following rocks is most resistant to natural erosion processes?

- A) Limestone B) Calcite-rich rocks C) Gypsum D) Granite

- 280.** Why is Granite preferred for flooring in high-traffic areas like stations and hospitals instead of Limestone? Or Minerals with high hardness are used in crowded areas to ensure
- A) Resistance to wear and scratching B) Floor shine C) Ease of cleaning D) Cost reduction
- 281.** If you have a sample of Calcite (Hardness 3), which tool can scratch it according to field hardness tests ?
- a) Fingernail b) Copper coin c) Gypsum piece d) Iron nail
- 282.** A student tried to scratch a rock sample with its fingernail and failed, but it was scratched by a metal coin. What is the approximate hardness of this sample ?
- a) 1.2 b) 2 c) 2.8 d) 5
- 283.** Which of the following minerals represents degree (10), the highest level of hardness on the Mohs scale?
- a) Quartz b) Gypsum c) Diamond d) Feldspar
- 284.** The mineral malachite always appears in thecolour
- A) Yellow B) Red C) Green D) Blue
- 285.** "Fool's Gold" is a name given to the mineral
Or Which of the following minerals possesses a metallic luster?
- A) pyrite B) Malachite C) Galena D) Feldspar
- 286.** Although the similarity in color and luster between Gold and Pyrite, how can a geological engineer definitively distinguish between them on-field ?
- a) By observing the color only b) By using a hardness test or measuring specific gravity
c) By examining the cleavage in one direction d) By checking the transparency of the sample
- 287.** Specific gravity is measured by comparing the mass of a volume of a mineral to the mass of the same volume of water at a temperature of
- A) 0°C B) 4°C C) 25°C D) 100°C
- 288.** What is the scientific explanation for the "conchoidal fracture" observed in Quartz?
- a) Presence of weak bonding planes b) High Lead content
c) Exposure to atmospheric humidity
d) Strong chemical bonds in all directions and absence of cleavage (Because it lacks planes of weakness (cleavage), causing it to break irregularly.)
- 289.** The specific gravity of the mineral galena is considered high because it ...
- A) contains silica B) contains the heavy element Lead
C) has a glassy luster D) has high hardness

- 290.** The pattern that appears when a mineral breaks irregularly and does not follow cleavage planes is called
- A) Streak **B) Fracture** C) Luster D) Hardness
- 291.** The mineral characterized by perfect cleavage in one direction, appearing as thin sheets, is ..
- A) Quartz **B) Mica** C) Feldspar D) Calcite
- 292.** The mineral group that "dominates" the composition of most of the Earth's crust is
- A) Oxides **B) Silicates** C) Sulfides D) Carbonates
- 293.** Adjusting electronic signals" in mobile phones functionally depends on the mineral
- A) Quartz** B) Iron C) Gold D) Cobalt
- 294.** Which of the following represents an application of the "electrical oscillation" of minerals?
Or Which of the following technological industries would be completely "disrupted" if quartz were lost?
- A) High-speed train B) Wind turbines C) Lithium batteries **D) GPS devices**
- 295.** The element iron is used in the manufacture of "electric cars" to achieve the goal of
- A) increasing weight B) reducing speed
C) sustainability and reducing pollution D) changing the shape of roads
- 296.** Egypt's "Heading to Future" project primarily aims to
- A) extract gold from mountains **B) enhance strategic connectivity and support export ports**
C) build new pyramids D) increase desert area
- 297.** The mineral called the "oil of the twenty-first century" is
- A) Quartz B) Titanium C) Calcite **D) Lithium**
- 298.** Calcium and Iron" compounds are used in the medical field as
- a) Surgical scalpels b) Anesthetics **c) Nutritional supplements** d) Equipment cleaners
- 299.** Imaging internal body organs with extreme clarity and high precision without surgical intervention is a description of the function of
- A) Traditional X-rays B) Sonar **C) Magnetic Resonance Imaging (MRI)** D) Electronic Microscope
- 300.** Which of the following medical technologies depends on "Neodymium (Nd), Iron (Fe), and Boron (B) alloys"?
- a) Magnetic Resonance Imaging (MRI)** b) Dental implants
c) Laser glucose monitoring d) Prosthetic limbs

301. An element that plays a pivotal role in the manufacture of smart "lithium-ion batteries" is ...
a) Gold b) Silver **c) Cobalt** d) Magnesium
302. Which of the following factors can change the type of rock without changing its chemical composition?
A) Complete melting B) Rapid cooling **C) High pressure and heat** D) Chemical weathering
303. The presence of large crystals inside an igneous rock usually indicates that the rock:
A) cooled slowly deep within the Earth B) was exposed to mechanical weathering
C) was formed by a rapidly erupting volcano D) had its layers deposited at the bottom of the sea
304. Which of the following processes is considered the beginning of the formation of sedimentary rocks?
A) Melting **B) Weathering and erosion**
C) Crystallization from magma D) Rearrangement of minerals
305. When studying a rock that contains clear layers and grains of varying sizes, it can be concluded that this rock was formed as a result of:
A) cooling of magma **B) pressure on sediments over a long time**
C) change in minerals under severe heat D) melting of an older rock
306. Sediments transform into "sedimentary rocks" as a result of
A) Fragmentation by weathering **B) Their accumulation and pressure over time**
C) Exposure to extreme cold D) Boiling in the seas
307. Lava on the surface" upon cooling gives rocks
A) Stratified sedimentary **B) Igneous** C) Pressure-metamorphic D) Fine sand
308. The "Rock Cycle" often begins with
a) Igneous rocks b) Sedimentary rocks c) Metamorphic rocks d) Fine sands
309. The glass we use daily depends in its manufacture on Or The mineral "Silicon" is an element mainly extracted from
A) cooling of magma B) pressure of limestone C) melting of marble **D) Sands**
310. Which of the following processes is NOT from the ways of mineral formation in the Earth's crust?
a) Biological decomposition of organic substances.
b) Rearrangement of mineral atoms due to pressure and heat.
c) Precipitation of salts when water evaporates.
d) Crystallization of magma upon cooling

Lesson 3:

- 311.** The "Organic Origin Theory" states that most oil is formed from the decomposition of.....
 a) ancient forest plant remains b) sedimentary rock remains
 c) marine microorganisms remains d) terrestrial plants and animals remains
- 312.** Which of the following methods is used to extract petroleum from rocks?
 A) Conventional drilling and crude oil extraction B) Direct distillation of water
 C) Distillation under atmospheric pressure only D) Iron extraction
- 313.** Oil companies use 3D seismic sensing technology to.....
 a) identify the oil accumulation sites more accurately. b) refine petroleum at the well site
 c) convert heavy hydrocarbons into lighter ones. d) measure the Earth's internal temperature
- 314.** The rocks in which hydrocarbons are found within their folds are called.....
 a) cap rocks. B) source rocks. C) igneous rocks d) metamorphic rocks
- 315.** The oil accumulation underground within rock layers surrounded by dome-shaped impermeable layers is called
 a) source rocks. B) Rock caverns. C) oil traps. D) oil refineries
- 316.** Strong steel casings (pipes) are used inside the well during drilling for oil extraction.....
 a) heat the oil. B) prevent leaks and ensure well stability.
 C) cool the drilling machines. D) convert oil to gas
- 317.** When a large volume of air is pushed into a small cavity inside rocks, the pressure within the cavity?
 a) decreases. B) increases. C) remains constant. D) vanishes
- 318.** Crude oil is heated in special furnaces before entering the distillation tower to a temperature...
 a) 100 C° b) 250 C° c) 400 C° d) 1000 C°
- 319.** What is the purpose of the fractional distillation process for petroleum?
 A) Separating compounds based on color
 B) Separating compounds based on their density and different boiling points
 C) Mixing chemical compounds together D) Producing water
- 320.** In oil traps, the vertical arrangement of materials from top to bottom is.....
 a) Oil, Gas, Water. B) Water, Oil, Gas C) Gas-Oil, Water. D) Oil, Water, Gas

- 321.** In the fractional distillation tower, diesel and kerosene condense at.....
a) the top of the tower. B) the bottom of the tower
c) the middle of the tower. D) the bottom and the top of the tower
- 322.** The substance that remains at the bottom of the fractional distillation tower is.....
a) Benzene. B) Kerosene. C) Bitumen. D) Naphtha
- 323.** Which of the following products results from the fractional distillation of petroleum?
A) Gasoline, diesel, wax, and asphalt B) Water, salt, limestone, and iron
C) Uranium, silicon, and quartz D) Gypsum, limestone, and clay
- 324.** Why are some microorganisms (microbes) used in petroleum extraction?
A) To color the petroleum B) To break down rocks and mobilize oil trapped in rock pores
C) To freeze petroleum D) To generate electricity directly
- 325.** What is the main factor affecting the quantity of petroleum extracted from rocks?
A) The amount of salts in surface water B) The permeability and pore size of the rocks
C) Air temperature only D) The type of surrounding vegetation
- 326.** Resins and synthetic fibers derived from petrochemicals are used in the manufacture of....
a) jet fuel. B) electronic devices. C) road paving. D) ship fuel
- 327.** When nuclear fission occurs in a uranium nucleus, the energy is released in the form of:
A) Heat only B) Light only C) Heat, kinetic energy, and nuclear particles D) Sound waves
- 328.** The main function of nuclear rods inside nuclear reactors is.....
a) cooling the reactor. B) acting as nuclear fuel.
C) absorbing external radiation. D) storing nuclear waste
- 329.** Which of the following illustrates the source of nuclear energy used at the El Dabaa plant?
A) Solar heat B) Coal C) Uranium D) Natural gas
- 330.** Atoms of the same element that have the same atomic number but differ in mass number are called.....
A) ions. B) molecules. C) isotopes. D) compounds.
- 331.** The most common isotope of uranium in nature is.....
a) U-234. B) U-235. c) U-238 d) U-239
- 332.** Modern nuclear reactors, characterized by their ease of installation and lower fuel use, are called.....

- 342.** Which of the following situations best illustrates a practical application based on the principle of storing energy using compressed air inside lithospheric caverns?
- A) Storing electricity in lithium batteries inside industrial buildings
 - B) Using natural salt caverns to compress and release air to power generators during peak consumption
 - C) Increasing wind speed around turbines to boost generation efficiency
 - D) Storing natural gas in underground pipelines
- 343.** Natural hydrogen relies on a reaction inside the rocks. What is the most logical result if the rocks have a low content of the Olivine mineral?
- A) Natural hydrogen production increases due to high rock permeability
 - B) Hydrogen production stops completely because rocks become unable to absorb water
 - C) The rate of natural hydrogen formation decreases due to the absence of the essential element in the reaction
 - D) Pressure increases inside the rocks, leading to their explosion
- 344.** Which explanation clarifies why some countries prefer storing compressed air energy inside rock caverns instead of industrial concrete structures?
- A) Rocks provide a stable temperature that reduces energy loss during storage
 - B) Concrete structures are more expensive but store more energy
 - C) Compressed air moves faster inside concrete compared to rocks
 - D) Rocks completely prevent air loss during operation
- 345.** Electric charges are generated on the surface of piezoelectric materials when exposed to.....
- a) intense light.
 - b) intense heat.
 - C) bending or vibration.
 - D) air currents
- 346.** One of the main advantages of geothermal energy is that.. ..
- a) It is dependent on solar heat.
 - B) It is available only in summer.
 - c) It is a clean energy source available year-round.
 - D) It requires drilling to great depths
- 347.** The main purpose of injecting water into deep rock fissures is.....
- a) fragment hard rocks.
 - B) gain extreme heat from rocks
 - c) clean rocks of deposits.
 - D) storing groundwater for drinking
- 348.** The imbalance in the distribution of the electrical charges in the structure of a piezoelectric material occurs due to.....
- a) the divergence of the material's molecules when melted
 - b) the breakdown of chemical bonds between atoms of the material
 - c) an increase in the surface area of the material when fragmented
 - d) The deformation of the crystal structure of the material when pressed

349. The new mineral formed from the reaction of water molecules with iron in olivine inside rock fractures is.....

- a) quartz. **B) serpentine.** C) gypsum. D) calcite

350. Which conclusion is the most accurate when comparing compressed air energy and natural hydrogen energy as resources from the lithosphere?

- A) Both require high heat from Earth's interior for their production
B) Natural hydrogen is produced via a chemical reaction inside the rocks, while compressed air relies on the physical properties of the rocks for energy storage
 C) Compressed air is more environmentally hazardous because it releases greenhouse gases
 D) Neither can be stored in the lithosphere due to poor rock permeability.

Question 2:

Essay Questions:

A) Write the scientific term for each of the following statements:

1) Represents the maximum pressure exerted by the blood on the artery walls. when the heart (left ventricle) contracts to push the blood to the parts of the body.	(Systolic pressure)
2) Massive rock fragments that resemble floating plates, which constitute the lithosphere	(tectonic plates)

B) Give reasons for:

1) Biosphere is considered an integrated system that includes all living organisms and their habitats on Earth?

Biosphere is the part of Earth where life exists, extending from the depths of the oceans to the highest mountain peaks, and encompassing land and air.

2) The types of living organisms differ in different environments?

as abiotic factors are responsible for determining the type of living organisms that can inhabit a specific area, as every living organism requires defined environmental conditions to grow and survive

3) Plants are considered biotic factors in the ecosystem?

Biotic factors include all living organisms that affect the environment and are affected by it, such as plants produce food through the process of photosynthesis which is considered the primary source of energy for the rest of the organisms.

4) The ecosystem is considered an integrated unit in nature?

because the interaction of biotic and abiotic factors together forms a balanced ecosystem that maintains the continuity of life within the biosphere. For example, in a lake ecosystem, fish, algae,

and bacteria interact with the physical and chemical elements of water in a continuous cycle of matter and energy exchange.

5) Predators are necessary for the stability of the ecosystem.

Because predators are carnivores which start with the secondary consumers, through which energy is transferred between different levels in the food chains, thus maintaining the stability and balance of the ecosystem.

6) The numbers of large predators (such as lions) are very few consider to the numbers of preys in the ecosystem?

Because the amount of energy available to large predators only supports a small number of individuals as we move up the energy pyramid from producers to consumers.

7) Carbohydrates are considered the main source of energy in living organisms?.

Since these compounds are broken down inside cells to produce the energy needed for vital activities.

8) Proteins are necessary for building the body of living organisms?

Since proteins form the main structural material in the bodies of living organisms, they are involved in the structure of muscles, enzymes, antibodies and some hormones.

9) The ability of giant trees to lift water to biggest heights.

(Water ascends in plants despite the lack of an internal pump?)

As the cohesion forces between water molecules with each other, the adhesion forces between water molecules and the walls of the xylem vessels, and the transpiration pull create a continuous pulling (attraction) force to water column within the tree from the root to the trunk and leaves then to great distances.

10) The presence of valves in the heart.

because it prevents the backflow of blood from ventricle to atrium .

11) Hemoglobin affects blood viscosity .

because the viscosity of blood changes with the variation in the ratio of the blood components (especially hemoglobin or red blood cells), and this affects on the effort required to pump the blood.

12) Aerobic cellular respiration is more efficient at energy production than an aerobic respiration?.

because during the aerobic respiration:

- A large amount of ATP molecules are produced (approximately 36 ATP molecules per one glucose molecule)., while during the an aerobic respiration.
- A limited amount of energy is produced (only about 2 ATP for one glucose molecule).

13) Cellular respiration is considered an exothermic reaction?

Because in the process of aerobic cellular respiration, chemical reactions occur that result in the release of energy stored in ATP molecules,

14) A disturbance in body functions occurs when metabolic waste accumulates.

Because the accumulation of waste products leads to disruption of the chemical balance of fluids inside the body and affects the efficiency of cell function, which leads to body toxicity.

15) The nephron is considered the functional unit of the kidney

because nephrons as microscopic units are responsible for filtering urine (the fluid created to eliminate excess water, excess salts, urea, and other dissolved wastes.) from the blood while useful substances such as glucose, ions, and water are returned to the body in the amount needed by the body in a process called reabsorption, to maintain homeostasis.

16) The volume of Urine increases when large amounts of water are drinking.

Because the kidneys eliminate excess water from the body to maintain fluid and electrolyte balance.

17) Why losing large amounts of water is considered "dangerous to human life"?

Loses large amounts of water and nutrients, leads to:

Severe dehydration.

Electrolyte imbalance (disturbance in the level of body mineral salts).

Low blood pressure (in some cases).

Possible failure of the body's vital organs.

18) Excreting a large amount of Sweat in hot weather helps the body remain in Homeostasis.

Because the skin contains sweat glands that secrete sweat, which helps to regulate the body temperature. When sweat evaporates from the skin surface, it removes excess heat, keeping the body at a nearly constant temperature.

19) The skin plays a vital role in "thermal regulation" in hot environments.

It regulates body temperature: the skin secretes sweat from the sweat glands, and as it evaporates from the skin's surface, it removes some excess heat, keeping the body at a relatively constant temperature

20) The skin plays a dual role in human life.

The skin contains Sweat glands that secrete Sweat which helps regulate body temperature; when sweat evaporates from the surface of the skin, it removes some of the excess heat, which keeps the body at a relatively constant temperature. Furthermore, the expulsion of water, salts, and a very small percentage of Urea with Sweat is considered a form of excretion that helps maintain the balance of fluids and ions within the body

21) The liver acts as a main "processing station" for toxins.

as it works to purify the blood from harmful substances and wastes resulting from biochemical reactions, and contributes to maintaining Homeostasis by converting toxic substances into safe compounds that are easy for the body to dispose of, so It serves as a

detoxification center or a "treatment plant" that protects the body from the accumulation of toxins.

- 22) Ammonia is converted into Urea in the body before it is excreted.

Because ammonia is a toxic substance, the liver converts it into the less harmful substance "urea," which is then transported to the kidneys and excreted in urine

- 23) Excretion is essential for maintaining the biological balance (or Homeostasis) of the living organism.

because excretion is not limited to getting rid of waste from within living organisms but represents an important link in the continuity of the element cycles in nature. The substances resulting from excretion, such as Carbon dioxide and Urea, return to participate in the Carbon and Nitrogen cycles and others, where Urea is decomposed in the soil by bacteria into ammonia, the nitrates to be absorbed by the plant which ensure the reuse of elements and the continuity of life in the biosphere.

- 24) Animal respiration contributes to the sustainability of plant life.

because animal releases carbon dioxide gas during respiration and animal absorb it during photosynthesis.

- 25) Phosphorus is not considered a pollutant of the atmosphere.

because the atmosphere is not part of the phosphorus cycle

- 26) Dendrites contribute to increasing the efficiency of data reception.

The nervous system operates at a speed that exceeds the hormonal system.

because They are extensions that come out of the nerve cell body, increasing the surface area, allowing the neuron to receive more nerve signals.

- 27) Inhibiting the Sodium-Potassium pump by the toxin Ouabain leads to the cessation of nervous system function.

As the sodium-potassium pump plays a crucial role in maintaining the neural membrane potential difference in the polarization state (-70 mV) by releasing (3Na^+) against the entry of (2K^+) for each ATP molecule. As by inhibiting this pump with this toxin, a disturbance occurs at the neural cell polarization

- 28) Hyperpolarization occurs immediately after repolarization.

Due to the excess outflow of K^+ outside the cell

- 29) The nerve impulse is called an electrochemical change.

because In nerve cells, the distribution of ions (Na^+ and K^+) inside and outside the cell is different, so this chemical change arises a potential difference through the cell membrane, causing A series of pulses travel along the axon of neuron from the depolarization, then repolarization, then depolarization again.

- 30) The presence of a synaptic cleft between two nerve cells is essential despite its extremely small size.
as The neurotransmitters diffuse across it to bind to specific receptors on the next cell.
- 31) Sodium ions are considered the key to starting the nerve signal.
On the arrival of a sufficient stimulus to the nerve cell membrane, changes occur in its permeability to ions, leading to the inflow of sodium ions (Na) inside the cell by high rate. So, the potential difference becomes about (+40 mV), so that the depolarization state occurs.
- 32) Carbon Nanotubes are used in the design of future space elevators.
When carbon particles are reduced to the nanoscale, their hardness and strength increase with lighter weight.
- 33) Nanotechnology is considered a bridge between biology, physics, and chemistry in the service of environmental sustainability.
-Scientists have utilized nanotechnology in various applications across different fields: such as Biofuel cells are considered an excellent example of mimicking biological processes in technology to generate energy for man-made devices.
- 34) Rocks differ in their properties even though they are composed of common minerals.
because each mineral has fixed or semi-fixed chemical composition and a regular crystalline structure gives it distinctive physical properties.
- 35) Minerals are considered the basis for modern industries such as medicine and technology.
because they are considered as raw materials in different fields such as lithium it is used in the manufacture of batteries for medical devices, such as cardiac pacemakers, and in modern technology such as Smartphones Digital watches. Laptops.
- 36) Metamorphic rocks do not usually contain fossils.
because they form as a result of exposing for intense pressure and heat without melting in earth's interior not as a result to disintegrating of rock through weathering, erosion and lithification forming sedimentary rocks in layers may be contain remains of dead living organism among them (fossil).
- 37) The rock cycle is a continuous process despite the difference in geological ages.
as rocks change from one type to another over time. as a result of the exposure of rocks to:
External factors, such as water, wind, and temperature changes.
Internal factors, such as heat, pressure, and internal forces of the Earth.
change them from one type to another.
- 38) "Silicon" contributes to reducing reliance on fossil fuels.
- because it use in Solar panels, that convert sunlight into clean electrical energy.
- 39) Titanium is considered the first choice in bone implant surgeries.
Due to its ability to integrate with body tissues without being rejected by the immune system and its high strength despite its light weight.

40) The lithosphere represents a "natural reservoir" that ensures technological development. because it is rich in mineral resources (raw materials such as quartz, silicon, lithium), whose importance is not limited to shaping the Earth's surface but extends beyond that to become an essential part of the industrial, medical and technological developments in the world.

41) Lithosphere rocks remain an "inexhaustible treasure" despite consumption. because the lithosphere acts as an integrated unit that continually reshapes its materials through the rock cycle to ensure Earth's stability and the continuity of its resources throughout the ages.

C) What happens in each of the following cases:

1) Receptors are absent in the post-synaptic membrane.

The neurotransmitters didn't bind to the next cell, leading to the sodium and potassium channels in its membrane remaining closed, and no generation for a new nerve impulse.

D) Compare the following:

1) Compare between exothermic reactions –endothermic reaction in term of :

P.O.C	exothermic reactions	endothermic reaction
Sign of ΔH	Negative charge	positive charge
H_R , H_P	$H_R > H_P$	$H_R < H_P$

2) Compare the continental crust and oceanic crust (considering their predominant chemical composition and density).

P.O.C	continental crust	oceanic crust
chemical composition	Rocks rich in silica and aluminum are known as sial rocks.	Rocks rich in silica and magnesium, in addition to iron, are known as sima rocks
density	It has a lower density than the oceanic crust due to the nature of its rocks and chemical composition, as it is rich in aluminum.	It has a higher density than the continental crust because it is rich in magnesium and iron

3) Compare glassy luster and metallic luster, providing an example for each from your study.

P.O.C	glassy luster	metallic luster
example	Appears like glass, even if colors vary, like quartz and calcite.	Reflects light strongly, like gold and pyrite

4) Variant questions:

1- How do you explain that a "biosphere" is a higher organizational level than an "ecosystem"?
 because Biosphere encompasses all life on planet Earth (all ecosystems), but ecosystem includes Living organisms and non-living components that interact together in a certain area.

2- Explain: Why is a complex food web "more flexible" against changes
 because the complex food web that consist of multiple interconnected chains where the consumer does not rely on a single type of food, but on multiple sources, makes the biological community more resilient to the loss of a single species.

3- Trace the impact of groundwater pollution with toxic chemicals on the food chain.
 if the polluted Groundwater is absorbed by plants(producer), this will cause negative impacts on all next trophic levels (consumers) making disinter connected food chain leading to imbalance and damage of this ecosystem.

4- Explain how a "food web" reflects the stability or disturbance of a biological community?
 as it makes the biological community more resilient to the loss of a single species, but it also makes negative, wide-ranging impacts, such as the removal of vegetation cover or water pollution, whose influence extends throughout the entire web.

5- Clarify the importance of "chlorophyll" in the continuity of the biosphere?

As the green plant absorbs light energy from the Sun using chlorophyll to produce food through the process of photosynthesis which is considered the primary source of energy for the rest of the organisms forms a balanced ecosystem that maintains the continuity of life within the biosphere.

6- The following figure represents a food web. Assuming the plant produced energy equal to 300,000 J.

A) According to the diagram, what is the minimum energy the hawk might receive from the plant? **30 J.**

B) Explain the food chain that leads to the hawk receiving the minimum amount of energy from the plant.

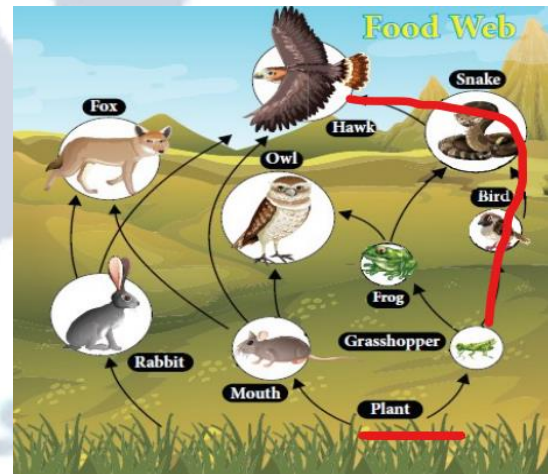
plant → grasshopper → Bird → snake.

7- what happen in the case of: the absence of decomposers from the ecosystem.

This leads to the accumulation of organic matter and dead organisms, and the nutrient cycle stops which negatively affects all levels of ecological organization

8- In the light of your study, what is the role of modern technology in saving the Iberian lynx herds from extinction?

Smart collars working principle: It depends on measuring the animal's movement rate, pulse, and



body temperature, then analyzing the data using artificial intelligence (AI) to determine the amount of energy the animal loses.

Smart collars importance: Measuring the amount of energy an animal consumes each day during its activity and its search for food.

9- Explain the role of mitochondria in "recharging" the ADP molecule .

as mitochondria can provide ADP with energy By adding a new phosphate group, and reform the active ATP molecule from ADP.

10- Explain :The importance of the presence of companion cells associated with sieve tubes.

As they are specialized cells to which sieve tubes are attached, for supplying them with energy (ATP molecules) and helping them to regulate the movement of nutrients through the phloem

11- Explain: The importance of lignin in xylem vessels for tall plants such as trees .

To give vessels strength and stiffness (rigidity), and prevent their collapse, then help them to resist compression, allowing the vessels to maintain their shape even in the tallest plants

12- Explain why :There are two types of vascular tissues (xylem and phloem) in plants?

These systems are the transportation systems that enable them to transfer water, salts, and nutrients within their parts, despite the absence of a specialized organ for pumping, like the heart in humans, where: The Xylem tissue is responsible for transporting water and mineral salts absorbed from the soil to the leaves, where the process of photosynthesis takes place.

Phloem tissue transports the products of photosynthesis, such as glucose and amino acids, from the leaves to all parts of the plant, including the roots, fruits, and seeds.

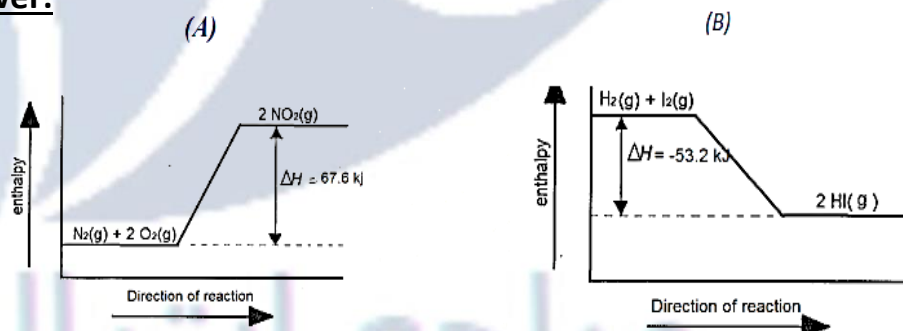
13- Trace : the pathway of chemical energy stored in glucose during anaerobic.

The process begins in the cytoplasm with a stage known as Glycolysis, where a single glucose molecule is broken down and yields limited energy (only about 2 ATP molecules) with the formation of products such as lactic acid in muscle cells, or alcohol in yeast.

14- Study the following figures then answer:

a- Which reaction required energy to occur? (A)

b- Which reaction will increase the temp. of the surrounding medium? (B)



15- If you know the following reaction take place under hard condition $\text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_2\text{O}(\text{s}) + 6.03 \text{ KJ/mole}$, $[\text{H} = 1, \text{O} = 16]$ Calculate the amount of heat lost from 252 g of water to freeze.

$$64 \text{ gm} \rightarrow 2 \text{ mol} \rightarrow -790 \text{ KJ}$$

$$0.972 \text{ gm} \rightarrow 0.03 \text{ mol} \rightarrow ?? \text{ KJ}$$

$$?? = \frac{-790 \times 0.03}{2} = -11.99 \text{ KJ}$$

16- From the following equation: $2S_{(s)} + 3O_{2(g)} \rightarrow 2SO_{3(g)}$, $\Delta H = -790 \text{ KJ}$ What is the change value in heat content of combustion of 0.972 g of Sulphur [S = 32]

$$32 \text{ gm} \rightarrow 1 \text{ mol}$$

$$32 \text{ gm} \rightarrow 726.5 \text{ KJ}$$

$$?? \text{ gm} \rightarrow 4359 \text{ mol}$$

$$?? = \frac{4359 \times 32}{726.5} = 192 \text{ gm}$$

17- From the following reaction: $CH_3OH + 3 O_2 \rightarrow 4 H_2O + 2 CO_2$ $\Delta H = -726.5 \text{ kJ/mol}$ - If an amount of energy equal to 4359 kJ is released, calculate the mass of methanol burned? (C= 12 , H = 1 , O = 16).

$$18 \text{ gm} \rightarrow 6.03 \text{ KJ}$$

$$252 \text{ gm} \rightarrow ?? \text{ KJ}$$

$$?? = \frac{6.03 \times 252}{18} = 84.42 \text{ KJ/mol}$$

18- Explain: why metabolic wastes are considered "by-products" despite originating from essential reactions.

Although metabolic reactions are essential for life, they do not always produce beneficial substances. Many of them leave behind by-products that the body does not need, and which may be harmful if they accumulate.

19- Explain: Why does the accumulation of CO_2 "threaten vital processes"?

because the accumulation of carbon dioxide gas in blood increases the blood acidity, which disrupts the function of enzymes and threatens biological processes in the body.

20- Explain: the role of the lungs in the excretion process?.

In the process of cellular respiration, the body's cells use Oxygen and Glucose to produce energy, which results in water and Carbon dioxide moves from the cells into the blood, which carries it to the lungs to be expelled outside the body with exhaled air.

21- Explain: The bioartificial kidney can contribute to reducing dependence on traditional dialysis.

It is based on cell engineering, as the bio-kidney contains specialized cells (either harvested or engineered in the laboratory) which mimic some of the biochemical functions of the kidney, such as:

- Regulating the levels of certain mineral salts.
- Secreting important compounds

22- Clarify the role of humans in disrupting the carbon cycle.

as Quantities of Carbon oxides return back to the atmosphere again are emitted from factories and fuel combustion into the air.

23- Explain: the role of photosynthesis as a chemical driver of the carbon cycle.

Green plants absorb carbon dioxide gas from the atmosphere during the photosynthesis process to manufacture food (glucose, organic compound) is transferred to animals (herbivores) when they feed on plants.

24- Explain: The nitrogen cycle represents an example of cooperation among living organisms.

-as The nitrogen cycle begins :

1. with the fixation of atmospheric nitrogen by a type of bacteria in the soil and its conversion into compounds that can be absorbed by plants.
2. Nitrogenous compounds are transferred to animals through food.
3. Nitrogenous compounds return to the soil through waste or dead organisms, where types of bacteria convert these compounds back into nitrogen gas, which then returns to the atmosphere

25-Clarify the role of nerve endings in converting the electrical signal into a chemical communication language. (What is the direct effect of the entry of calcium ions the synaptic knob upon the arrival of a nerve impulse?

When the electrical signal reaches the end of the axon, several special calcium ion (Ca^{2+}) channels are opened, allowing the signals to pass into the synaptic knob, which leads to the release of neurotransmitters in the synaptic cleft, leading to the opening of sodium and potassium ion channels in its membrane, generating a new nerve impulse.

26- Explain: The role of "selective permeability" during polarization state.

Which allows the exit of K^+ ions at a higher rate than the entry of Na^+ ions into the cell.

27- How does the nervous system contribute to the stability of the biosphere?

where this system:

1. Enables organisms to adapt to environmental changes, as the balanced interaction between living organisms and their environments maintains the foundation for the continuity of life on Earth.
2. Maintains homeostasis within living organisms, as the nervous system signals regulate different vital activities to ensure the living organism's precise and rapid response to environmental changes

28- What are the types of nerve cells inside the human body?.

Sensory Neurons: These transmit information from the sensory receptors to the Central Nervous System (CNS) (the brain and spinal cord).

Motor Neurons: These transmit commands to the response organs, which are muscles and glands.

Interneurons (Association/Relay Neurons): These act as a link between the sensory and motor neurons.

29- Explain: Nanomaterials have a higher capacity for chemical interaction.

Because by decreasing the size of particles their active surface area increases relative to their volume and so their ability to react increases.

30- Explain: The classification of Quantum Dots based on their dimensions.

All dimensions of the material (length - width - height) are on the nanoscale, so it is Zero-dimensional nanomaterials (OD).

31- Explain: The increase in hardness of Nano-copper compared to ordinary copper.

When copper particles are reduced to the nanoscale, their hardness and strength increase compared to ordinary copper, This change is due to two main factors, which are:

- 1) Increase in the surface area-to-volume ratio (increasing chemical activity)
- 2) Quantum effects (causing the material to behave in entirely new ways)

32- Explain: why traditional cancer treatments are called a double-edged sword.

Because they kill cancerous cells, but they also cause severe side effects throughout the body and damage healthy cells and tissues.

33- Explain the operating principle of Neural Nano-electrodes.

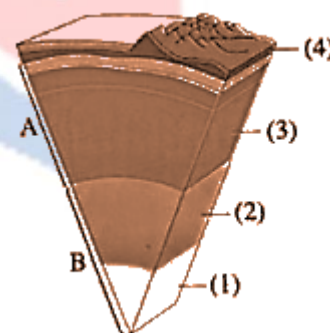
by using neural nanotech interfaces (neural nano-electrodes) implanted in the brain, have been able to help paralyzed patients move their limbs or communicate via devices simply by thinking.

34- Explain how nanotechnology can improve the efficiency of biofuel cells.

Nanoparticles such as gold nanoparticles or carbon nanotubes are used to coat the electrodes inside the cell, Where they act as electrical catalysts, they facilitate and enhance the efficiency of electron transfer and accelerate reactions, just as enzymes within mitochondria accelerate the reactions of cellular respiration.

35- Explain the role of "blood glucose" and the sustainability of implanted medical devices.

from the process of cellular respiration through which living cells produce energy from food (where glucose is oxidized within mitochondria in the presence of oxygen to produce energy molecules (ATP)) scientists design devices that generate clean and safe energy, which can power implanted medical devices inside the body by using glucose present in the blood as an energy source.



36- The opposite figure shows a model of a section in the Earth. Study it carefully, then answer:

(a) What is the chemical composition of layer (1)? **Iron and nickel**

(b) What is the physical state of layer (2)? **liquid**

37- Describe (using equations or explanation) how the lithosphere helps regulate the carbon cycle and reduce atmospheric CO₂ levels.

When rocks containing silicate minerals, such as basalt and gabbro, rocks rich in calcium a pyroxene (CaSiO₃) are exposed to water and carbon dioxide (CO₂), chemical reaction occurs, leading to the breaking down of minerals, as calcium ions (Ca²⁺) are released that react with bicarbonate ions (HCO₃⁻) resulting from the reaction, which leads to the formation of calcium bicarbonate Ca(HCO₃)₂, which dissolves in flowing water, which decreases the percentage of carbon dioxide gas in air.



38- How do porous volcanic rocks (such as Zeolites) function as a sustainable technological solution for water-related issues.

As zeolite rocks are porous volcanic rocks act as natural filters, that trap impurities and heavy metals inside their pores.

39- Explain: Silicate rocks (such as quartz) are considered more resistant to weathering than limestone. (Or Rocks that are composed of Carbonate salts, such as limestone, develop more caves and cavities than rocks composed of Silica.)

As sandstone consists of quartz, which is made of silica (SiO_2) whose atoms are bonded by covalent bonds that makes it resistant to the break down and dissolving in water, while limestone consists of calcite (CaCO_3) whose atoms are bonded by ionic bonds that break down and easily dissolve in water.

40- Explain: Why is the chemical weathering of rocks considering a "natural production line" for the sustainment of life. (Or Chemical weathering of rocks plays a role in supplying plants with the minerals necessary for their growth.)

because when the minerals of the lithosphere are exposed to the weathering factors such as (Rainwater, Temperature changes, Weak acids, they begin to gradually decompose into ions that the soil retains; Thus, this process transforms into a "natural production line" for nutrients needed by plants.

41- Explain: Although the speed of tectonic plates is very small, its effects are significant and visible.

The movement of tectonic plates works as a natural tool to Continuously reshape the Earth's surface, as their effects are clear and significant despite the slow movement.

42- Explain: Convergent movement contributes to the formation of towering mountain ranges. (Or Mountain ranges appear in areas of Tectonic plate collision, whereas they do not appear in areas of plate divergence.)

It occurs when two plates move toward each other, leading to their collision, results in compression and uplift of rocks, forming towering mountain ranges, such as the Himalayas.

43- Given an iron nail and an Alabaster sample, how can you practically prove that Alabaster is less hard?

Try to scratch a sample of alabaster with an iron nail, the alabaster rock will scratch by iron nail.

44- Explain: "Mineral color alone cannot be depended as a primary identifying characteristic." give two examples from your studied to support your answer.

As different minerals may share the same color (Malachite appears in a clear and distinctive green color.) or the mineral may exist in more than one color (Calcite appears in various colors .)

45- All that glitters is not gold." Apply this saying scientifically to Gold and Pyrite, explaining the fundamental differences between them.

Pyrite is known as "Fool's gold", because it displays a golden metallic luster similar to real gold, but it differs from it in composition and density.

46- Explain: how studying the physical properties of minerals contributes to maintaining the stability and continuity of the lithosphere's balance.

By studying the materials that compose Lithosphere, we can understand how Lithosphere remains balanced and continues to perform its vital and structural role on Earth, as Determining the specific gravity of rocks at construction sites helps in determining the composition of the rock strata during drilling or geophysical surveying.

47- Cleavage is a property that must be studied accurately when selecting rocks for construction." Discuss this statement, explaining the engineering risks that may arise from neglecting this property.

as using rocks that contain minerals with clear cleavage in the construction of quarry walls or building sites can lead to their splitting into layers or breaking apart, when exposed to mechanical stress, which increases the likelihood of collapses or slides.

48- Infer the environmental role of iron in the modern transportation industry.

as it is used in manufacture of Giant wind turbines whose metal structures form the backbone of their ability to produce clean electricity to operate Electric cars and high-speed trains, which contribute to reducing carbon emissions and achieving a more sustainable future.

49- Two samples of different minerals (A) and (B) have the same volume, with masses of 60 g and 75 gm respectively and the mass of the same volume of water at a temperature of 4°C is 10 gm. Calculate the specific gravity of each mineral.

$$\text{Specific gravity (Relative density)} = \frac{\text{Mass of a specific volume of a material}}{\text{Mass of the same volume of water at } 4^{\circ}\text{C}} = \frac{60}{10} = 6 \text{ \& } \frac{75}{10} = 7.5$$

50- How can piezoelectricity be used in large shopping centers?

Generating electricity from pedestrian steps in stations and shopping centers, where smart floors convert the foot pressure into energy used to power lighting or charge small devices.

مراجعات النخبة

كيفية طباعة صفحات معينة من ملف معين

مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9



حمل الآن

مجاناً وحصرياً

المراجعة رقم (2)

الترم الثاني



الدرس - الأول -

First : Choose the correct answer :

1. It is where living organisms are found on, above and below the Earth's surface?.....
 - a. Lithosphere
 - b. Biosphere
 - c. Atmosphere
 - d. Hydrosphere
2. It refers to all forms of water on Earth. It includes surface water bodies like rivers, oceans, lakes, and ponds, groundwater, water vapor (clouds and fog) in the atmosphere, and ice?...
 - a. Lithosphere
 - b. Biosphere
 - c. Atmosphere
 - d. Hydrosphere
3. It is a blanket of gases that surrounds Earth. It is held near the surface of the planet by Earth's gravitational attraction?.....
 - a. Lithosphere
 - b. Biosphere
 - c. Atmosphere
 - d. Hydrosphere
4. It is a rigid, rocky outer layer of Earth, consists of the crust and the solid outermost layer of the upper mantle?.....
 - a. Lithosphere
 - b. Biosphere
 - c. Atmosphere
 - d. Hydrosphere
5. Which of the following processes represents an interaction that links the biosphere, atmosphere, and lithosphere all at once?.....
 - a. Animals breathing oxygen
 - b. Plants absorbing water, salts, and CO₂ to produce food
 - c. Water evaporation from the ocean surface
 - d. Volcanic eruptions on the ocean floor
6. Which of the following processes illustrates the role of the biosphere in influencing the components of the atmosphere?.....
 - a. Plants absorb carbon dioxide to produce food
 - b. Rocks crumble due to growth of large tree roots
 - c. Evaporation of sea and ocean water by solar heat
 - d. Groundwater flow between porous soil layers
7. Which process represents the only pathway for water from the biosphere to the atmosphere according to the plant life cycle?.....
 - a. Respiration
 - b. Transpiration
 - c. Photosynthesis
 - d. Decomposition

18. The diversity of organisms in rainforests differs from deserts due to.....
- a. difference in the type of consumer organisms only
 - b. difference in climatic characteristics
 - c. the lithosphere is missing in forests
 - d. absence of bacteria in deserts
19. Plants are classified as "autotrophic" because they have the ability to.....
- a. consume organic matter from the soil
 - b. convert inorganic matter into energy-storing organic compounds
 - c. absorb oxygen to produce glucose
 - d. survive without water
20. Which of the following organisms can perform photosynthesis?....
- a. Fungi
 - b. Primary consumers
 - c. Herbivores
 - d. Some specialized bacteria
21. What process do plants use to convert light energy into chemical energy?.....
- a. Cellular respiration
 - b. Photosynthesis
 - c. Decomposition
 - d. Fermentation
22. Which compound is the source of carbon in photosynthesis?.....
- a. Glucose
 - b. Carbon dioxide
 - c. Adenosine triphosphate (ATP)
 - d. Water
23. What is the main result of photosynthesis?.....
- a. Converting light energy into chemical energy stored in glucose
 - b. Producing adenosine triphosphate (ATP)
 - c. Producing carbon dioxide
 - d. Producing water
24. Which compound is used as a byproduct (secondary product) of photosynthesis?.....
- a. Adenosine triphosphate (ATP)
 - b. Oxygen
 - c. Glucose
 - d. Water
25. Which of the following organisms represents the "link" that returns matter from the final consumer back to the producer?.....
- a. Algae
 - b. Fungi
 - c. Hawk
 - d. Rabbit
26. What is the main role of decomposers in an ecosystem?.....
- a. Conversion of light energy into chemical
 - b. Recycling chemical energy back into the soil
 - c. Preying on other organisms
 - d. Producing oxygen

71. Nucleic acids carry genetic information because their structure contains.....
- chains of amino acids
 - high-energy phosphate bonds
 - nitrogenous bases arranged in a specific system
 - chains of fatty acids
72. Why is DNA, and not RNA, responsible for transporting genetic information across generations?.....
- Because it is smaller in size
 - Due to its double-stranded structure
 - Because it exists in the cytoplasm
 - Because it does not contain phosphate
73. The "Genetic Code" results from the difference in.....
- the sequence of nitrogenous bases
 - the type of sugar only
 - the number of phosphate groups
 - the sequence of amino acids
74. What might happen if there were no RNA in the cell?...
- Protein synthesis will stop despite the presence of DNA
 - Proteins will continue to be synthesized normally
 - The number of nucleotides in the DNA will increase
 - DNA will become capable of producing energy directly
75. CRISPR-Cas9 technology is described as a....
- light microscope
 - digestive enzymes
 - diet system
 - high-precision molecular scissor
76. Which of the following compounds is considered the main source of energy in the cell?....
- Proteins
 - Lipids
 - Carbohydrates
 - Nucleic Acids
77.represent the structural substances of most structures in the body
- Amino acids
 - Nucleic acids
 - Monosaccharides
 - Fatty acid and glycerol

Second : Problems :

1. If the amount of energy that a rabbit gets from plants is equal to 100 joules, how much energy can reach the fox that feeds on the rabbit?.....
- 10 joules
 - 50 joules
 - 90 joules
 - 100 joules

Energy reaching rabbit from plants = 100 J

Energy transferred to fox = $10\% \times 100 = 10 \text{ J}$

2. If we assume a plant produced energy equal to 40,000 J, then the total energy lost by the secondary consumer as heat, energy used in its biological processes, and energy stored in undigested materials equals.....

a. 40 J b. 400 J c. 360 J d. 3600 J

Plant energy = 40000 J

Primary consumer receives = $10\% \times 40000 = 4000$ J

Secondary consumer receives = $10\% \times 4000 = 400$ J

Energy lost by secondary consumer = $90\% \times 4000 = 3600$ J

3. If a plant receives 1000 joules of solar energy and uses only 2% for photosynthesis, how much energy is lost?...

a. 20 joules b. 200 joules c. 980 joules d. 1000 Joules

Solar energy = 1000 J

Energy used in photosynthesis = $2\% \times 1000 = 20$ J

Energy lost = $1000 - 20 = 980$ J

4. When the organisms of the second trophic level obtained energy equal 20000 energy unit, and the un-transferred energy amount for the third trophic level equals 18060 energy unit.

So, the efficiency of energy transfer process from the second trophic level to the third one..

a. 8% b. 9.7% c. 70% d. 90.3%

Energy in 2nd trophic level = 20000 units

Un-transferred energy = 18060 units

Transferred energy = $20000 - 18060 = 1940$ units

Efficiency = $1940 \div 20000 \times 100 = 9.7\%$

5. In the opposite figure :

What is the ratio of the mass available to primary consumers consider to producers?.....

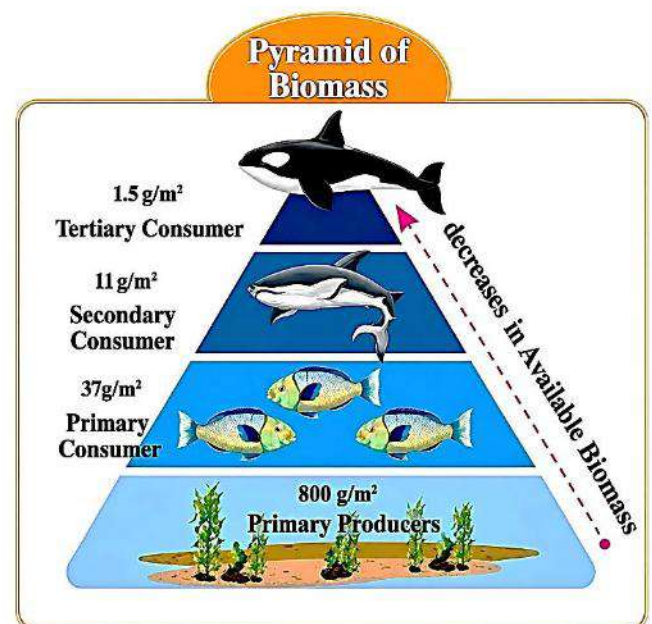
a. 0.187% c. 4.62%
b. 1.37% d. 10%

What is the ratio of the mass available to secondary consumers consider to producers?.....

a. 0.187% c. 4.62%
b. 1.37% d. 10%

What is the ratio of the mass available to tertiary consumers consider to producers?.....

a. 0.187% b. 1.37% c. 4.62% d. 10%



Primary consumers / Producers = $37 \div 800 \times 100 = 4.625\% \approx 4.62\%$

Secondary consumers / Producers = $11 \div 800 \times 100 = 1.375\% \approx 1.37\%$

Tertiary consumers / Producers = $1.5 \div 800 \times 100 = 0.1875\% \approx 0.187\%$

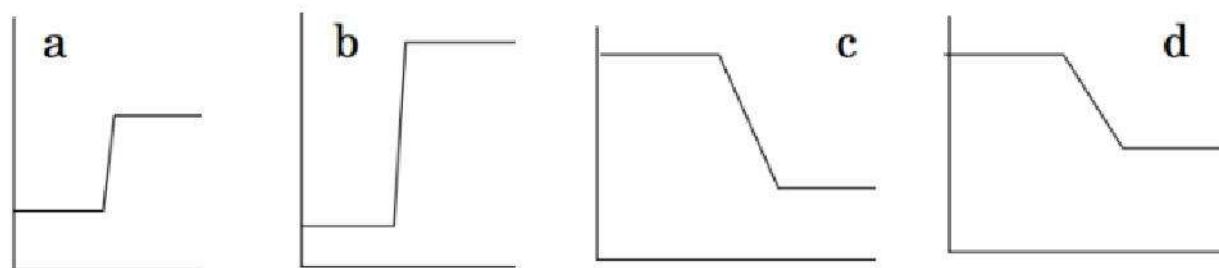
الدرس - الثاني -

First : Choose the correct answer :

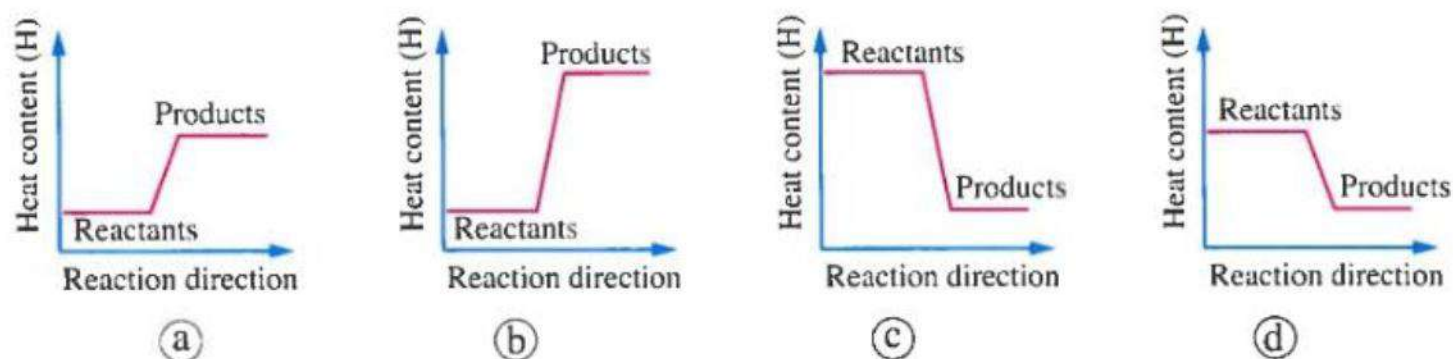
1. Which of the following processes is responsible for converting potential energy in food into active energy?.....
 - a. Transport
 - b. Excretion
 - c. Respiration
 - d. Photosynthesis
2. The primary function of xylem tissue in plants is to transport.....
 - a. products of photosynthesis
 - b. water and minerals
 - c. oxygen
 - d. energy
3. The presence of lignin in the walls of xylem vessels helps to.....
 - a. store organic materials
 - b. give the cells flexibility and softness
 - c. resist the tension pressure during ascent of water
 - d. regulate stomata opening
4. The Cohesion-Adhesion theory depends primarily on the properties of ...
 - a. water molecules
 - b. oxygen
 - c. food molecules
 - d. carbon dioxide
5. Movement of water in xylem vessels relies primally on physical forces, the most important of which are...
 - a. Cohesion and adhesion only
 - b. Cohesion and adhesion and the tensile force resulting from transpiration
 - c. Active transport of energy
 - d. The tensile force resulting from transpiration only
6. If the leaves of a pine tree are coated with a waxy substance that blocks the stomata, the first process to stop will be...
 - a. lignin production
 - b. water flow in the phloem
 - c. upward movement of water to the leaves
 - d. food storage
7. During summer, why does the process of transpiration become more important for the plant?.....
 - a. Because it helps cool the leaves
 - b. Because it increases sugar storage
 - c. Because it reduces salt absorption
 - d. Because it stops photosynthesis

34. The accumulation of lactic acid in muscles leads to.....
- a. products of photosynthesis
 - b. feeling of muscle fatigue (tired)
 - c. decreases in water and minerals
 - d. increased muscle activity
35. To remove the muscular fatigue, muscle should be provided with a sufficient amount of..
- a. glucose
 - b. oxygen
 - c. glycogen
 - d. glucose and oxygen
36. Anaerobic fermentation in yeast cells produces.....
- a. oxygen
 - b. lactic acid
 - c. water only
 - d. ethanol
37. If a substance is innovated to increase the efficiency of oxygen transport to mitochondria, it is expected to....
- a. increase lactic acid fermentation
 - b. aerobic respiration switches to anaerobic respiration
 - c. increase the efficient in energy production
38. In the cellular respiration experiment using seeds, it was observed that the limewater in flask (A) (at room temperature) turned cloudy faster than in flask (B) (in the refrigerator)
- How can this difference be analyzed?.....
- a. The rate of oxygen production is higher in flask (A)
 - b. The rate of carbon dioxide consumption is higher in flask (B)
 - c. The rate of cellular respiration (CO_2 production) is higher in flask (A)
 - d. The seeds in flask (B) died due to extreme cold
39. In exothermic system,
- a. Heat transfers from the surrounding medium to system
 - b. Heat transfers from the system to the surrounding medium
 - c. Heat doesn't transfer between the system and surrounding medium
 - d. The temperature of system is rising
40. Which process is considered an exothermic system?.....
- a. Freezing
 - b. Evaporation
 - c. Melting
 - d. Water-heating
41. In an exothermic reaction,.....
- a. the energy stored in the products is less than the energy stored in the reactants
 - b. the energy stored in the reactants is less than the energy stored in the products
 - c. the surrounding medium lose heat
 - d. the system gains heat

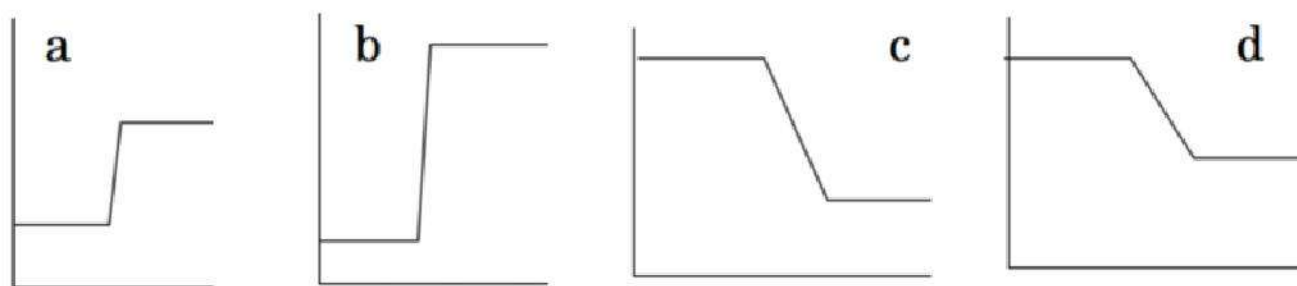
57. Which graph represented a reaction produces largest amount of energy (heat) to surrounding medium?.....(c).....



58. Which of the following graphs represents a chemical reaction in which the reactants absorb the least amount of heat energy from surrounding?.....(a).....



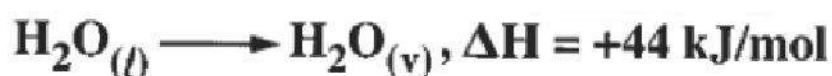
59. Which one from following graphs represented a reaction that absorbed the largest amount of energy (heat) from the surrounding medium?.....(b).....



60. If ΔH for the reaction = +200 KJ, then.....

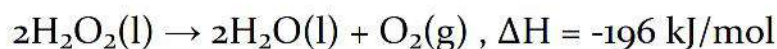
- a. The system releases heat
- b. The system gains heat
- c. The surrounding medium gains heat
- d. ΔH is negative

61. From the following equation :



- a. heat content of water vapour > heat content of liquid water
- b. heat content of water vapour = half heat content of liquid water
- c. heat content of water vapour < heat content of liquid water
- d. heat content of water vapour = heat content of liquid water

3. In the reaction :



What is the change in heat of the decomposition of 0.34 g of hydrogen peroxide (H_2O_2)
(H = 1, O = 16)

a. -0.98 kJ

b. -1.96 kJ

c. -196 kJ

d. -98 KJ

① A mole of $\text{H}_2\text{O}_2 = (2 \times 1) + (2 \times 16) = 34 \text{ gm}$
So, Number of moles in 0.2 gm

$$\frac{\text{Mass}}{\text{Molar mass}} = \frac{0.2 \text{ g}}{34} = 0.01 \text{ mole}$$

③ 2 mole of $\text{H}_2\text{O}_2 \longrightarrow 196 \text{ KJ/mole}$
 $\therefore$ 1 mole of $\text{H}_2\text{O}_2 \longrightarrow ? \text{ KJ/mole}$

$$\therefore \Delta H = \frac{-196 \times 0.01}{2} = -0.98 \text{ KJ/mole}$$

4. From the following equation:



What is the change value in heat content of combustion of 0.972 g of sulphur [S = 32]

① Mole of Sulphur = 32 gm

② No. of moles in 0.972 gm = $\frac{\text{Mass}}{\text{Molar Mass}}$
 $= \frac{0.972}{32} = 0.030375 \text{ mole}$

③ 2 mole of (s) $\longrightarrow \Delta H = -790 \text{ KJ}$
0.030375 mole of (s) $\longrightarrow \Delta H = ?$

$$\Delta H = \frac{-790 \times 0.030375}{2} = -11.99 \text{ KJ}$$

5. The equation illustrates the complete combustion reaction of a type of alcohol



a. Is this reaction Endothermic or Exothermic? And why?

b. Calculate the amount of heat released (in kJ) from the combustion of 80 g of methanol

Molar mass of $\text{CH}_3\text{OH} = 12 + (4 \times 1) + 16 = 32 \text{ gm}$

No. of moles in 80 gm

No. of moles = Mass / Molar mass = $80 / 32 = 2.5 \text{ mole}$

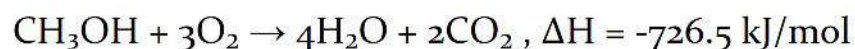
From the equation:

2 mole of $\text{CH}_3\text{OH} \rightarrow \Delta H = -726.5 \text{ kJ}$

2.5 mole of $\text{CH}_3\text{OH} \rightarrow \Delta H = ?$

$\Delta H = (-726.5 \times 2.5) / 2 = -9081.25 \text{ kJ}$

8. From the following reaction:



If an amount of energy equal to 4359 kJ is released

Calculate the mass of methanol burned?

(C = 12, H = 1, O = 16)

①	A mole of methanol CH_3OH $= (12) + (16) + (4 \times 1) = 32 \text{ gm.}$
②	No. of moles of methanol = 1 mole $\longrightarrow \Delta H = -726 \text{ KJ/mole}$ 2 mole $\longrightarrow \Delta H = -4.359 \text{ KJ/mole}$ $\frac{1 \times 4.359}{726} = 6 \text{ moles.}$
③	Mass = No. of moles $\times$ Molar mass $= 6 \times 32 = 192 \text{ gm.}$

9. By using the following equation of burning of octane:



Then the change in (ΔH) enthalpy when 4 moles are resulted from CO_2 equal...

- a. -5450 KJ b. +5450 KJ c. +2725 KJ d. -2725 KJ

Exothermic	
16 mole $\longrightarrow$	-10900 KJ/mole
4 moles $\longrightarrow$	?
$\therefore \Delta H = \frac{4 \times 10900}{16} = -2725 \text{ KJ}$	

10. If the enthalpy of the reactants is 2584 kJ and that of the products is 5642 kJ, then this reaction is

- a. exothermic, with ΔH negative c. exothermic, with ΔH positive
b. endothermic, with ΔH negative d. endothermic, with ΔH positive

11. If the heat enthalpy of reactant (H_R) is 1250 KJ and enthalpy of product (HP) 1720 KJ then....

- a. The reaction is endothermic, $\Delta H = +470 \text{ KJ}$
b. The reaction is exothermic, $\Delta H = -470 \text{ KJ}$
c. The reaction is exothermic, $\Delta H = +470 \text{ KJ}$
d. The reaction is endothermic, $\Delta H = -470 \text{ KJ}$

الدرس - الثالث -

First : Choose the correct answer :

1. Metabolism is a process of
 - a. catabolism only
 - b. anabolism only
 - c. both catabolism and anabolism
 - d. excretion only
2. Which of the following illustrates the dual nature of metabolism?.....
 - a. Muscle contraction and relaxation
 - b. Nerve impulse transmission
 - c. Protein synthesis and glucose breakdown
 - d. Inhalation and exhalation
3. The relationship between "catabolism" and metabolic waste products is.....
 - a. direct; increased catabolism increases waste products
 - b. inverse; catabolism reduces waste products
 - c. constant; unaffected by activity
 - d. metabolic waste products are limited to the products of anabolism only
4. Ammonia is a waste product resulting from the breakdown of.....
 - a. starch
 - b. fats
 - c. amino acids
 - d. glucose
5. All the following are from the excretory products, excepts.....
 - a. CO₂
 - b. nitrogen
 - c. water
 - d. urea
6. What explains the relationship between excretion and Homeostasis in the.....
 - a. expelling water only
 - b. maintaining the stability of the body's internal environment
 - c. energy production
 - d. oxygen transport
7. Which of the following shows the importance of excretion in homeostasis?.....
 - a. Preventing accumulation of harmful by-products
 - b. Maintaining stable blood glucose levels
 - c. Ensuring oxygen delivery to tissues
 - d. Regulating nerve impulse speed
8. The accumulation of metabolic wastes directly leads to.....
 - a. increase rate of catabolism
 - b. increase efficiency of cells
 - c. decrease in temperature
 - d. disturbance of the chemical balance of fluids

30. Bile juice helps in the disposal of

- a. glucose
- b. blood vessels
- c. excess cholesterol
- d. oxygen

31. Which excretory organ would be most affected when consuming foods containing dyes?....

- a. Lungs
- b. Bladder
- c. Liver
- d. Skin

32. Which of the following organs is considered the primary organ responsible for removing the nitrogenous waste from the blood?...

- a. The liver
- b. The skin
- c. The kidneys
- d. The lungs

33. The relationship between the liver and kidney in dealing with proteins is.....

- a. the kidney breaks down proteins and the liver expels them
- b. the liver converts ammonia into urea and the kidney excretes it
- c. both absorb proteins
- d. no relationship

34. Which of the following illustrates the correct pathway to get rid of urea substance from the body?.....

- a. Liver → Kidney → Urethra → Urinary bladder
- b. Liver → Urethra → Kidney → Ureter
- c. Liver → Kidney → Ureter → urethra
- d. Liver → ureter → kidney → urinary bladder

35. What is the primary method for removing carbon dioxide from the human body?.....

- a. Secreting it from the skin
- b. Exhaling it from the lungs
- c. Excreting it in urine
- d. Excreting it in faeces

36. Which of the following metabolic waste its accumulation increases blood acidity?.....

- a. Carbon dioxide
- b. Urea
- c. Mineral salt
- d. Ammonia

37. Increased blood acidity caused by CO₂ negatively affects ...

- a. enzyme activity
- b. skin
- c. bones
- d. hair

38. Which of the following substances would be expected to be found at a higher level than normal level in a blood sample from a patient with kidney failure?.....

- a. Glucose
- b. Ammonia
- c. Urea
- d. Salts

5. The liver acts as a main "processing station" for toxins.

The liver is a detoxification center or treatment plant for treating the wastes, where it acts on :

Purifying (Detoxifying) the blood from harmful substances and accumulated waste products resulting from biochemical reactions

Converting the toxic substances into safe compounds to make it easier for the body to get rid of them, which protects it from the accumulation of toxins

6. The role of the lungs in the excretion process?

The role of the two lungs in the excretion becomes clear through the elimination of gaseous waste products (CO_2 gas and water vapor) produced by the cellular respiration that release to the atmosphere

7. Why does the accumulation of CO_2 "threaten vital processes"?

Because the accumulation of carbon dioxide gas in blood increases the blood acidity, which disrupts the function of enzymes and threatens the biological processes in the body

8. The bioartificial kidney can contribute to reducing dependence on traditional dialysis?

As this kidney works inside the patient's body or is implanted in it to perform the functions of a normal kidney

9. The role of photosynthesis as a chemical driver of the carbon cycle?

Green plants absorb carbon dioxide gas from the atmosphere during the photosynthesis process to manufacture food

Compounds containing organic carbon are transferred to animals (herbivores) when they feed on plants

Carbon oxides return back to the atmosphere again, as follows :

Carbon dioxide gas releases in air, when living organisms respire or decomposed

Quantities of carbon oxides are emitted from factories and fuel combustion into the air

10. Animal respiration contributes to the sustainability of plant life?

Carbon dioxide gas releases in air, when living organisms respire or decomposed, then green plants absorb carbon dioxide gas from the atmosphere during the photosynthesis process to manufacture food

11. The role of humans in disrupting the carbon cycle?

Through factories and fuel combustion

الدرس - الرابع -

First : Choose the correct answer :

1. The basic "structural units" of the nervous system are called.....
 - a. neurons
 - b. nephrons
 - c. peripheral nerves
 - d. cerebral lobes
2. The nerve cell is considered the fundamental unit in the formation of the nervous system, and its basic function is.....
 - a. hormone production
 - b. energy storage
 - c. nerve impulse transmission
 - d. body defense
3. The basic "receptive unit" in the complex neural network is.....
 - a. dendrites
 - b. nerve endings
 - c. axon
 - d. synaptic cleft
4. Which of the following represents the state of polarization?....
 - a. High permeability of sodium into the cell
 - b. Opening of Calcium channels
 - c. Accumulation of positive charges outside the membrane and negative charges inside
 - d. Constriction of synaptic vesicles
5. What explains the importance of the resting potential in a nerve cell?..
 - a. It prevents the cell from responding
 - b. It keeps the membrane ready to transmit the impulse when a stimulus occurs
 - c. It increases the number of synapses
 - d. It decreases the membrane permeability to water
6. Which of the following explains why the sodium-potassium pump requires energy?.....
 - a. As it moves ions down the concentration gradient
 - b. As it moves ions against concentration gradient
 - c. As it does not depend on ATP
 - d. As it only works during sleep
7. What is a correct ratio of ion exchange across sodium-potassium pump per ATP molecule?..
 - a. 3 sodium ions out versus 2 potassium ions in
 - b. 2 sodium ions out versus 3 potassium ions in
 - c. 1 sodium ion out versus 1 potassium ion in
 - d. 3 potassium ions out versus 2 sodium ions in

17. The complexity of brain functions compared to the spinal cord is due to the cells such as...
- a. sensory cells only
 - b. Purkinje cells with massive synapses
 - c. surface calcium receptors
 - d. long, unbranching axons
18. The difference between a regular neuron and a Purkinje cell lies in.....
- a. the type of ions used
 - b. the number of neural synapses
 - c. the presence of a nucleus
 - d. the method of impulse transmission along the axon
19. The Purkinje cell, which can receive hundreds of thousands of synapses, demonstrates...
- a. the nervous system is slow to respond
 - b. nerve cells function independently
 - c. the nervous system is an interconnected network that transmits information quickly and accurately
 - d. synapses are few in the brain
20. Chemical neurotransmitters are stored inside.....
- a. receptors
 - b. mitochondria
 - c. vesicles
 - d. sodium channels
21. What is the main function of neurotransmitters in the synapse?.....
- a. Storing energy
 - b. Breaking down ions
 - c. Transmitting the signal between two cells
 - d. Increasing axon speed
22. The minute space separating two neurons is called.....
- a. nerve axon
 - b. synaptic vesicles
 - c. synaptic knob
 - d. synaptic cleft
23. The "mechanical factor" responsible for moving vesicles toward the pre-synaptic membrane is.....
- a. sodium ions
 - b. specific enzymes
 - c. calcium ions
 - d. dendrites
24. Which of the following occurs immediately after the nerve impulse reaches the terminal knobs (buttons)?...
- a. Calcium exits the cell
 - b. Calcium enters and vesicles fuse with the membrane
 - c. Sodium channels close
 - d. Neurotransmitter breakdown

الدرس - الخامس -

First : Choose the correct answer :

1. Why is nanotechnology considered a revolution in human interaction with the biosphere?.....
 - a. Because it increases the size of cells to be seen by the naked eye
 - b. Because it eliminates the need to study traditional chemistry
 - c. Because it relies only on radiation for treatment
 - d. Due to its ability to observe and control matter at the level of atoms and molecules
2. Which of the following represents the most accurate explanation of the term "Nanotechnology"?.....
 - a. The study of dwarfs in ancient Greek times
 - b. The practical application of knowledge to control materials at the nanoscale
 - c. Measuring the distance between two points
 - d. The study of large molecules in their normal state
3. What is the result of one nanometer being one hundred thousand times smaller than the diameter of a human hair?.....
 - a. Inability to use it in medical applications
 - b. Increase in the weight of materials when converted to the nanoscale
 - c. Nanomaterials possess unique properties not found in their normal states
 - d. Easy of seeing nanomaterials with a regular light microscope
4. The change in material properties at the nanoscale is due to two main factors, which are...
 - a. color and hardness
 - b. increase in the ratio of surface area to volume and quantum effects
 - c. melting point and electrical conductivity
 - d. atomic size and electron speed
5. The properties of matter change at the nanoscale compared to its properties in the normal size due to.....
 - a. decrease in mass
 - b. increase in the ratio of surface area to volume
 - c. change in the composition of atoms
 - d. decrease in the temperature of matter
6. When matter is fragmented, the relationship between surface area and volume shows that
 - a. the volume decreases and the surface area increases
 - b. both the volume and surface area decrease
 - c. the volume decreases and the surface area does not change
 - d. neither the volume nor the surface area is affected

24. The movement of smart prosthetic limbs depends on.....

- a. nano-chip commands
- b. large external batteries
- c. wind movement
- d. automatic muscle response

25. The operating principle of Biofuel Cells is.....

- a. wood combustion
- b. wave movement
- c. cellular respiration
- d. solar energy

26. The function of biofuel cells is similar to the process of cellular respiration in that both.....

- a. produce energy from the oxidation of glucose
- b. consume ATP molecules
- c. store energy
- d. depend in their function on solar energy

27. Which organelle performs a function similar to the positive electrode?.....

- a. Mitochondria
- b. Vacuole
- c. Nucleus
- d. Cell wall

28. The primary fuel used in biofuel cells is.....

- a. gasoline
- b. external hydrogen gas
- c. glucose
- d. nano coal

29. In a biofuel cell, glucose is oxidized at....

- a. the positive electrode (cathode)
- b. inside the wires only
- c. in the light lamp
- d. negative electrode (anode)

30. Electrons in a biofuel cell move through an external circuit toward the.....

- a. cathode
- b. anode
- c. human body
- d. ground

31. The use of Nano-Gold in biofuel cells aims to.....

- a. act as an electrical catalyst
- b. prevent corrosion only
- c. produce red light
- d. make the device expensive

32. The role of carbon nanotubes in biofuel cells is.....

- a. storing glucose
- b. coating electrodes to increase surface area
- c. preventing protons from reaching the cathode
- d. cooling the device

33. Nanoparticles are used in biofuel cells because they.....

- a. reduce the rate of reactions
- b. increase the rate of transfer of electrons
- c. prevent the oxidation of reactants
- d. double the volume of enzymes

الدرس - السادس -

First : Choose the correct answer :

1. Which of Earth's layers accounts for only 1% of the planet's total volume?.....
 - a. Mantle
 - b. Core
 - c. Crust
 - d. Lithosphere
2. The scientific term "Sial" refers to continental crust rocks rich in
 - a. silica and aluminium
 - b. silica and iron
 - c. magnesium and nickel
 - d. calcium and potassium
3. What is the primary constituent of the oceanic crust known as "Sima"?.....
 - a. Silica and Aluminum
 - b. Silica and Magnesium
 - c. Iron and Nickel
 - d. Granitic rocks
4. Which of the following elements contributes to making the oceanic crust denser than the continental crust?..
 - a. Magnesium and Iron
 - b. Aluminum and Silica
 - c. Sodium and Potassium
 - d. Hydrogen and Helium
5. What is a primary reason for continents to rise above sea level compared to oceanic crust?..
 - a. Because the surface area of continents is larger than oceans
 - b. Because continental rocks are harder
 - c. Because the density of continental crust rocks is lower than that of oceanic rocks
 - d. Due to ice accumulation on continental mountain peaks
6. The largest of Earth's layers by mass (representing 67% of Earth's mass) is
 - a. the crust
 - b. the mantle
 - c. the outer core
 - d. the inner core
7. Why does the inner core remain solid despite extreme temperatures?.....
 - a. Due to sudden cooling
 - b. Because it contains nickel
 - c. Because of its far distance from the surface
 - d. Due to immense pressure
8. The Earth's magnetic field is generated by the movement of molten material in the
 - a. lower mantle
 - b. outer core
 - c. oceanic crust
 - d. upper mantle
9. The Lithosphere consists of
 - a. the earth's crust only
 - b. the entire mantle
 - c. the crust and the uppermost part of the mantle
 - d. the inner and outer core

19. Which of the factors most significantly affects the weathering rate of Carbonate rocks?....
- High rock density
 - High water salinity
 - High concentration of CO_2 in rainwater
 - High air temperature
20. The role of the lithosphere in the biosphere includes.....
- Providing oxygen directly to plants
 - Producing minerals necessary for plant growth
 - Increasing the proportion of Carbon dioxide in the atmosphere
 - Preventing water from leaking into the soil
21. The mineral "Phosphate" provides the soil with which essential ions for plant growth?.....
- Potassium ions
 - Phosphate ions
 - Calcium ions
 - Sodium ions
22. Which of the minerals decomposes to release potassium ions (K^+) essential for plants?.....
- Calcite
 - Phosphate
 - Feldspar
 - Quartz
23. Which of the following elements is primarily released from rocks due to weathering process and is used directly in building plant biomolecules?.....
- Iron
 - Potassium
 - Aluminum
 - Silica
24. The semi-molten rocks region of the upper mantle that allows for plate movement is called the
- Mesosphere
 - Asthenosphere
 - Sial
 - Outer Core
25. What is the driving force behind the movement of the tectonic plates above the asthenosphere?.....
- Convection currents
 - Gravity of the moon and the sun
 - Strong winds
 - Pressure resulting from the weight of ocean waters
26. The currents responsible for tectonic plate movement originate in the
- mesosphere
 - inner core
 - asthenosphere
 - continental crust
27. When two convergent tectonic plates move toward each other, the most likely result is.....
- Formation of new marine valleys
 - Uplift of rocks forming mountain ranges
 - Widespread volcanic lava over vast areas
 - Decrease in the concentration of minerals in the soil

الدرس - السابع -

First : Choose the correct answer :

- The lithosphere consists of minerals that are chemically bonded to form
a. soil b. rocks c. crystals d. gases
- Which of the following is "NOT" among the requirements for defining a mineral geologically?.....
a. Organic substance c. Naturally occurring solid substance
b. Regular crystalline structure d. Definite chemical composition
- A mineral characterized by an ability to cut glass and used in precision industries. This description indicates which property?.....
a. Color b. Hardness c. Cleavage d. Luster
- Which of the following physical properties expresses the degree of resistance of a mineral to scratching?.....
a. Luster c. Hardness
b. Cleavage d. Specific Gravity
- Minerals with high hardness are used in crowded areas to ensure
a. resistance to wear and scratching c. ease of cleaning
b. floor shine d. cost reduction
- Why is Granite preferred for flooring in high-traffic areas like stations and hospitals instead of Limestone?.....
a. Because Granite has an attractive glassy luster
b. Due to Granite's high hardness and resistance to erosion
c. Because Granite exhibits cleavage in one direction
d. Due to Granite's low specific gravity, making it easier to transport
- Which of the following minerals represents degree (10), the highest level of hardness on the Mohs scale?.....
a. Quartz b. Gypsum c. Diamond d. Feldspar
- The hardness of quartz on the Mohs scale isapproximately
a. 2 b. 4 c. 7 d. 10
- The material used in making glass tools due to its resistance to scratching is ...
a. gypsum b. mica c. calcite d. quartz
- The statue of Sphinx of Giza was made of Limestone rock, which has a hardness of ...
a. 2 : 3 b. 3 : 4 c. 6 : 7 d. 7

22. Why does the use of rocks with "clear cleavage" pose a risk in constructing quarry walls?..
- Because they are extremely heavy
 - Because they may split into layers and collapse under mechanical stress
 - Because their color change over time
 - Because they resist drilling operations
23. The pattern that appears when a mineral breaks irregularly and does not follow cleavage planes is called
- streak
 - fracture
 - luster
 - hardness
24. What is the scientific explanation for the "conchoidal fracture" observed in Quartz?....
- Presence of weak bonding planes
 - High Lead content
 - Exposure to atmospheric humidity
 - Strong chemical bonds in all directions and absence of cleavage
25. Why is the conchoidal fracture of Quartz considered evidence of strong chemical bonds in all directions within its crystal structure?.....
- Because it cleaves easily under pressure
 - Because its color changes based on the type of impurities
 - Because it has low hardness on the Mohs scale
 - Because it lacks planes of weakness (cleavage), causing it to break irregularly
26. Although the similarity in color and luster between Gold and Pyrite, how can a geological engineer definitively distinguish between them on-field?....
- By observing the color only
 - By using a hardness test or measuring specific gravity
 - By examining the cleavage in one direction
 - By checking the transparency of the sample
27. The mineral group that "dominates" the composition of most of the Earth's crust is
- oxides
 - silicates
 - sulfides
 - carbonates
28. Which of the following minerals has an atomic structure that makes it more resistant to "acid rain" rich in dilute carbonic acid?.....
- Calcite
 - Quartz
 - Hematite
 - Magnetite
29. When diluted hydrochloric acid is added to a rock sample and a strong "effervescence" occurs, which of the following ions appear in the resulting aqueous solution?.....
- Silicon
 - Iron and magnesium
 - Calcium and bicarbonate
 - Titanium and cobalt

الدرس - الثامن -

First : Choose the correct answer :

1. Organic origin theory of oil is the remains of
a. marine micro-organisms
b. land plants
c. volcanic rocks
d. space gases
2. The rock layer where oil is formed is called
a. source rock
b. reservoir rock
c. cap rock
d. salt rock
3. The accumulation of oil and gas in "oil traps" depends primarily on the presence of rock layers that are
a. impermeable (cap rock)
b. porous and permeable
c. solid and volcanic
d. rich in radioactive minerals
4. What is the main factor affecting the quantity of petroleum extracted from rocks?.....
a. The amount of salts in surface water
b. Air temperature only
c. The permeability and pore size of the rocks
d. The type of surrounding vegetation
5. Which of the following methods is used to extract petroleum from rocks?.....
a. Direct distillation of water
b. Conventional drilling and crude oil extraction
c. Distillation under atmospheric pressure only
d. Iron extraction
6. 3D Seismic sensing is used for
a. determining oil locations accurately
b. increasing viscosity
c. cooling wells
d. transforming uranium
7. Why are some microorganisms (microbes) used in petroleum extraction?
a. To color the petroleum
b. To freeze petroleum
c. To break down rocks and mobilize oil trapped in rock pores
d. To generate electricity directly
8. Bacteria in enhanced bio-recovery secrete
a. biopolymers and acids
b. solid minerals
c. oxygen gas
d. radioactive waste

9. What is the relationship between viscosity, cohesive forces among oil molecules and its effect on the production rate?.....
- High viscosity means weak cohesive forces and faster production
 - Low viscosity means strong cohesive forces and slower production
 - High viscosity means strong cohesive forces and slower production
 - There is no relationship
10. What is the purpose of the fractional distillation process for petroleum?....
- Separating compounds based on their density and different boiling points
 - Separating compounds based on color
 - Mixing chemical compounds together
 - Producing water
11. Fractional distillation depends on differences in
- colour
 - mass
 - crystal shape
 - boiling point
12. Which of the following products results from the fractional distillation of petroleum?...
- Gasoline, diesel, wax, and asphalt
 - Water, salt, limestone, and iron
 - Uranium, silicon, and quartz
 - Gypsum, limestone, and clay
13. The product which is formed from the top of the distillation tower and used as a fuel for cars is
- Gasoline
 - Benzine
 - Bitumen
 - Naphtha
14. In fractional distillation, if we want to collect fuel for aircraft or cars, we collect the components that condense at
- higher levels (Lower temperature)
 - lower levels (Higher temperature)
 - the absolute bottom
 - outside the tower as light gases
15. Which of the following illustrates the source of nuclear energy used at the El Dabaa plant?
- Uranium
 - Solar heat
 - Coal
 - Natural gas
16. Uranium-238 abundance
- 1 %
 - 99 %
 - 10 %
 - 50 %
17. If a Uranium sample has 92 protons and 146 neutrons, the correct chemical symbol for this isotope is
- $^{238}_{92}\text{U}$
 - $^{146}_{92}\text{U}$
 - $^{92}_{238}\text{U}$
 - U^{238}_{146}

27. What role do groundwater reservoirs play in geothermal power plants?
- a. Transferring heat from hot rocks to the turbines
 - b. Storing solar radiation
 - c. Generating electricity directly without heat
 - d. Increasing air pressure
28. In the "Thermal Reservoir" experiment, Box A maintains its temperature due to
- a. presence of compressed air
 - b. chemical reaction between sand and water
 - c. heat storage in the medium
 - d. using of piezoelectric energy
29. Which of the following statements correctly describes the EGS project?.....
- a. It relies on concentrated solar power
 - b. It burns coal to produce steam
 - c. It relies on wind to heat the rocks
 - d. It uses deep drilling to pump water into hot rocks to generate electricity
30. How does EGS technology overcome the limitations of traditional geothermal energy?....
- a. By reducing rock temperatures
 - b. By relying on Uranium instead of Earth's heat
 - c. By increasing carbon emissions
 - d. By exploiting hot rocks at great depths even without natural groundwater
31. What is the main environmental benefit of using nuclear and geothermal energy instead of fossil fuels?.....
- a. Increased coal consumption
 - b. Reducing greenhouse gas emissions
 - c. Increased production of toxic gases
 - d. Greater consumption of river water
32. Piezoelectricity in smart floors converts footsteps to
- a. heat
 - b. air pressure
 - c. biofuel
 - d. electrical energy
33. Piezoelectricity generation is based on a property of minerals like Quartz, which is
- a. generating a charge when vibrated or pressed
 - b. absorbing heat and storing it
 - c. nuclear fission
 - d. reacting with oxygen
34. CAES efficiency depends on
- a. Rock color
 - b. Rock strength and pressure resistance
 - c. Presence of oil
 - d. Humidity

حمل الآن

مجانا وحصريا

امتحانات رقم (1)

الترم الثاني



Exam 1 ? Answered

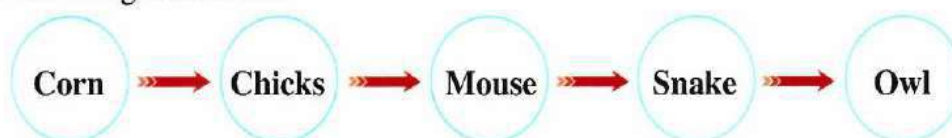
Choose the correct answer (1 : 20):

- 1 A piece of metal coin could not scratch a rock sample, while it was scratched by an iron nail. We conclude that the hardness of the minerals forming the rock is
(a) between 2 and 3 (b) between 3.5 and 4.5
(c) greater than 4.5 (d) between 5 and 7
- 2 From which part of the heart does oxygenated blood begin to be pumped to the body tissues during the systemic circulation?
(a) Right ventricle. (b) Left atrium. (c) Left ventricle. (d) Right atrium.
- 3 The average thickness of the lithosphere is
(a) 1 km (b) 10 km (c) 100 km (d) 1000 km
- 4 If the amount of energy transferred to the snake when preying on a rabbit is equal to 100 J, what is the amount of energy transferred from the grass to the rabbit?
(a) 10000 J. (b) 1000 J. (c) 10 J. (d) 1 J.
- 5 The secondary product of the reaction between iron in the olivine mineral and water to form the serpentine mineral is
(a) carbon dioxide gas (b) hydrogen gas (c) oxygen gas (d) nitrogen gas
- 6 The skin helps in decreasing the high body temperature by
(a) the activity of sebaceous glands (b) evaporating sweat from the skin surface
(c) absorbing heat from the external air (d) reabsorbing water from sweat
- 7 Which of the following statements is correct about aerobic and anaerobic respiration in muscle cells?
(a) Aerobic respiration produces substances used in anaerobic respiration.
(b) Both produce the same amount of ATP molecules.
(c) Both produce carbon dioxide gas.
(d) Aerobic respiration produces more energy.
- 8 The opposite figure shows a rock sample with a low ability to reflect light, so the rock is most likely to be
(a) gold
(b) pyrite
(c) quartz
(d) basalt



- 9** Complex carbohydrates are formed from the combination of many molecules of
(a) amino acids (b) fatty acids (c) monosaccharides (d) nucleotides
-
- 10** Which of the following materials are classified as one-dimensional nanomaterials?
(a) Quantum dots. (b) Graphene.
(c) Carbon nanotubes. (d) Porous nanomaterials.
-
- 11** Carbon returns from the bodies of organisms to the ecosystem through the processes of
(a) photosynthesis and growth (b) decomposition and respiration
(c) feeding and decomposition (d) respiration and growth
-
- 12** What happens when conventional electrodes in batteries are replaced with carbon nanotubes?
(a) The efficiency of battery decreases.
(b) The weight of battery increases.
(c) The efficiency of electron transfer and the speed of reaction increase.
(d) The battery stops working.
-
- 13** On touching a container in which neutralization reaction occurs between hydrochloric acid and sodium hydroxide, you feel heat. This indicates that
(a) the reaction absorbed heat from your hand
(b) the heat content of the products is greater than that of the reactants
(c) the reaction requires heating to start
(d) the reaction released thermal energy to the container
-
- 14** Electric charges are generated on the surface of piezoelectric materials when exposed to
(a) intense light (b) bending or vibration
(c) intense heat (d) air currents
-
- 15** In addition to selective permeability and the sodium–potassium pump, what is the other factor that contributes to the presence of the nerve cell membrane at polarization state?
(a) The unequal distribution of ions across the membrane.
(b) The absence of potassium ions inside the cell.
(c) The accumulation of sodium ions inside the cell.
(d) The entry of negative chloride ions into the cell.
-

16 In the following food chain:



How many consumers are present in this chain?

- (a) 2 (b) 3 (c) 4 (d) 5

17 What is the purpose of injecting microorganisms such as bacteria into old petroleum wells?

- (a) Cleaning the well from pollution.
(b) Increasing the amount of the extracted oil.
(c) Cooling the oil-bearing rocks.
(d) Determining the accumulation sites of oil more accurately.

18 In the mature plant, tracheids and xylem vessels are characterized as structures that are

- (a) living, and contain nucleus and cytoplasm
(b) non-living and hollow to facilitate water flow
(c) specialized for doing photosynthesis
(d) containing cytoplasm without a nucleus

19 Modern nuclear reactors which are characterized by being easily installed and lower fuel use, are called

- (a) giant reactors (b) second-generation reactors
(c) small modular reactors (d) third-generation reactors

20 The main function of the nervous system that enables the living organism to adapt to its environment is

- (a) transporting oxygen and nutrients to different body cells
(b) controlling the action of internal organs in the body
(c) regulating ion concentrations inside the body
(d) receiving information, processing it and producing suitable responses

Answer the following questions (21 : 23):

21 What is the role that the liver plays in the process of excretion?

.....
.....

22 Give reasons for:

(a) The Earth's center remains in a solid state, despite the extremely high temperature.

.....

(b) Steel casings (pipes) are used inside the well during drilling for oil extraction.

.....

- 23** Explain how animals in desert regions adapt to water scarcity and extreme heat.
-
-

Exam 2



Answered

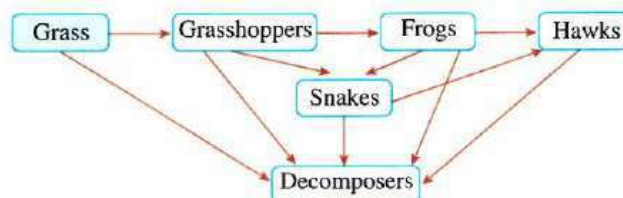
Choose the correct answer (1 : 20):

- 1** The property that caused pyrite to be known as "Fool's gold" is

- (a) its high density that equals that of gold
- (b) its chemical composition that is similar to gold
- (c) its metallic golden luster
- (d) its hardness on Mohs scale

- 2** In the opposite food web, which organisms obtain energy from the same food source?

- (a) Grasshoppers, snakes.
- (b) Hawks, frogs.
- (c) Frogs, snakes.
- (d) Decomposers, grass.



- 3** What does the systolic pressure represent in blood pressure measurement?

- (a) Maximum pressure exerted by the blood on the artery walls during the contraction of heart.
- (b) Blood pressure exerted on the artery walls during the relaxation of heart.
- (c) Average blood pressure in blood capillaries.
- (d) Pressure required for gas exchange in blood capillaries.

- 4** Which of the following is used in the manufacture of the strongest permanent magnets for Magnetic Resonance Imaging (MRI) machines?

- (a) Lithium and cobalt elements.
- (b) Quartz and feldspar ores.
- (c) Calcium and iron compounds.
- (d) Neodymium, Iron and Boron alloy.

- 5** If sodium concentration in blood decreases, the kidneys respond to maintain the body's homeostasis by

- (a) stopping filtration
- (b) excreting less amount of water
- (c) excreting more amount of water
- (d) reducing urine extraction

- 6** Which of the following equations correctly represents the alcoholic fermentation?

- (a) $C_6H_{12}O_6 \longrightarrow 2C_3H_6O_3 + 2ATP$
- (b) $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + 36ATP$
- (c) $C_6H_{12}O_6 \longrightarrow 2C_2H_5OH + C_2H_2O + ATP$
- (d) $C_6H_{12}O_6 \longrightarrow 2C_2H_5OH + 2CO_2 + 2ATP$

- 7 Geothermal energy is classified as
- (a) non-renewable and polluting energy (b) renewable and clean energy
(c) renewable and polluting energy (d) non-renewable and clean energy
-

- 8 Which of the following dimensions could belong to a non-nanomaterial?
- (a) 20 nm, 500 nm, 200 nm. (b) 90 nm, 125 nm, 30 nm.
(c) 200 nm, 300 nm, 150 nm. (d) 20 nm, 50 nm, 40 nm.
-

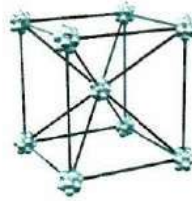
- 9 Which of the following structures represents the crystal lattice of iron?



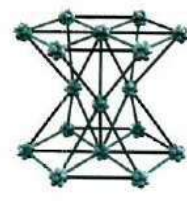
(a)



(b)



(c)



(d)

- 10 All of the following are from Earth's layers, **except** the
- (a) Earth's crust (b) troposphere (c) mantle (d) core
-

- 11 Accumulation of bilirubin in the human body leads to
- (a) kidney failure (b) jaundice
(c) increased blood acidity (d) uremic poisoning
-

- 12 Chemically, amylase enzyme is composed of
- (a) lipids (b) carbohydrates (c) proteins (d) phospholipids
-

- 13 During resting potential, the nerve cell membrane is
- (a) positive outside and negative inside (b) negative outside and positive inside
(c) neutral outside and negative inside (d) neutral inside and positive outside
-

- 14 Geiger counters are used in nuclear sites to
- (a) measure reactor temperature (b) monitor radiation levels
(c) measure vapor of radioactive elements
(d) identify uranium isotopes
-

- 15 The main source of phosphorus in nature is
- (a) atmospheric air (b) rocks (c) rainwater (d) lightning
-

16 A group of individuals of the same species that living and interacting in one place and time is called

- (a) community (b) population (c) biome (d) biosphere

17 A patient suffers from severed motor nerve, which of the following nanomaterials are most suitable to be used as a bridge for nerve impulse transmission?

- (a) Thin films. (b) Quantum dots. (c) Porous materials. (d) Nanowires.

18 Which statement correctly describes the relation between heat content of reactants and heat content of products in an endothermic reaction?

- (a) $H_R < H_P$ (b) $H_R = H_P$ (c) $H_R \geq H_P$ (d) $H_R > H_P$

19 Oil companies use 3D seismic sensing technology to

- (a) identify the oil accumulation sites more accurately
(b) refine petroleum at the well site
(c) convert heavy hydrocarbons into lighter ones
(d) measure the Earth's internal temperature

20 The main purpose of performing the Nerve Conduction Velocity test (NCV) is

- (a) evaluating the nerve function and determine the extent of damage
(b) measuring the muscle contraction strength in limbs
(c) analyzing the brain electrical activity
(d) stimulating the growth and regenerate damaged nerves

Answer the following questions (21 : 24):

21 What is the role of xylem tissue in plants?

.....
.....

22 What are the components that come out from the top of the petroleum fractional distillation tower?

.....
.....

23 Give reason for: Not all of the energy obtained by herbivores from their food is transferred to the animals that prey on them.

.....
.....

24 Write the scientific term for the following statement:

Massive rock fragments that resemble floating plates, which constitute the lithosphere.

.....

.....

Exam 3



Answered

Choose the correct answer (1 : 20):

1 The main blood vessel that carries oxygenated blood from the heart to the cells of the different body tissues is

- (a) pulmonary artery
- (b) aorta
- (c) pulmonary vein
- (d) vena cava

2 When comparing Earth's outer core and inner core, we find that they are

- (a) similar in components and physical state
- (b) different in components and physical state
- (c) similar in components and different in physical state
- (d) different in components and similar in physical state

3 What is the relation between the liver and kidney in excretion process?

- (a) The kidney produces urea and the liver expels it out of the body.
- (b) The liver converts ammonia into urea, and the kidney excretes urea in urine.
- (c) The liver absorbs water and the kidney filters it.
- (d) No functional relation exists.

4 What distinguishes cleavage from fracture in minerals?

- (a) All minerals exhibit cleavage and fracture at the same time.
- (b) Cleavage is random breaking, while fracture follows a geometric patterns.
- (c) Cleavage occurs only in soft minerals, while fracture occurs in hard minerals.
- (d) Cleavage produces smooth and defined surfaces, while fracture produces irregular surfaces.

5 The building unit of DNA is

- (a) amino acid
- (b) nucleotide
- (c) fatty acid
- (d) monosaccharide

- 6** The main function of nuclear rods inside the nuclear reactors is
 (a) cooling the reactor (b) acting as nuclear fuel
 (c) absorbing external radiation (d) storing nuclear waste
- 7** The general direction of the movement of water and salts within the xylem tissues in plants is
 (a) from leaves to roots for nourishment
 (b) in both directions depending on plant needs
 (c) from leaves to stem for support
 (d) from roots to leaves for completing photosynthesis
- 8** Which of the following represent the building unit of sedimentary rocks?
 (a) Organic remains. (b) Tectonic plates. (c) Minerals. (d) Hydrocarbons.
- 9** The peripheral nervous system includes
 (a) sensory neurons and brain (b) all nerves throughout the body
 (c) spinal cord and motor neurons (d) brain and spinal cord
- 10** In the following food chain:
 Green plant → Grasshopper → Mouse → Fox
 Which organism could be replaced by hawk in this chain?
 (a) Mouse. (b) Fox. (c) Grasshopper. (d) Green plant.
- 11** Two-dimensional nanomaterials have
 (a) two dimensions outside the nanoscale and one nanoscale dimension
 (b) two dimensions inside the nanoscale and one non-nanoscale dimension
 (c) two dimensions outside the nanoscale and an internal porous structure
 (d) two dimensions inside the nanoscale and an internal nanostructure
- 12** The skin layer containing hair follicles and blood vessels is
 (a) epidermis (b) dermis (c) hypodermis (d) fatty layer
- 13** What role does cobalt play in modern medical technology?
 (a) It is used as a main component in artificial joints.
 (b) It helps to deliver drugs directly to cancer cells.
 (c) It is considered as an essential component in nutritional supplements.
 (d) It is used in the production of lithium-ion batteries for smart medical devices.

Answer the following questions (21 : 23):

21 How can piezoelectricity be utilized in large shopping centers?

.....

.....

22 What happens when the rate of fossil fuel combustion increases with respect to the carbon element in the atmosphere?

.....

.....

23 What is the direct effect of the entry of calcium ions the synaptic knob upon the arrival of a nerve impulse?

.....

.....

Exam 4



Answered

Choose the correct answer (1 : 20):

1 Which nanomaterial can be used to move the opposite limb?

- (a) Silver nanoparticles.
- (b) Quantum dots.
- (c) Porous materials.
- (d) Carbon nanotubes.



2 What is the primary function of lignin in xylem vessel walls?

- (a) Facilitating water absorption from soil.
- (b) Providing support and stiffness to prevent the collapse of vessels.
- (c) Reducing adhesion forces with water molecules.
- (d) Regulating water movement inside the vessel.

3 Which type of neurons connects between the cells transmitting information from sensory receptors to the central nervous system and the cells transmitting commands from the central nervous system to response organs?

- (a) Sensory neurons.
- (b) Motor neurons.
- (c) Interneurons.
- (d) Purkinje cells.

4 From the main advantages of geothermal energy is that

- (a) it is dependent on solar heat
- (b) it is available only in summer
- (c) it is a clean energy available throughout the year
- (d) it requires drilling to great depths

5 Which factor(s) primarily determine(s) the type of living organisms that live in a certain area?

- (a) Biotic factors.
- (b) Abiotic factors.
- (c) Lithosphere only.
- (d) Hydrosphere only.

6 If the decomposition stops in the carbon cycle in nature, this will lead to

- (a) increasing CO₂ level in air
- (b) carbon remaining in dead organisms
- (c) increasing the efficiency of photosynthesis
- (d) increasing fossil fuel stock

7 Specific gravity of a material is the ratio between the mass of the material and the mass of the same volume of

- (a) water in solid state
- (b) air at sea level
- (c) water at a temperature of 4°C
- (d) magma at Earth's surface

8 Which of the following biological processes ensures the delivery of essential substances to each cell in the living organism?

- (a) Digestion.
- (b) Transport.
- (c) Excretion.
- (d) Respiration.

9 The main purpose of expanding the usage of nuclear energy is producing electricity that is

- (a) low-cost
- (b) low in carbon emissions
- (c) dependent on fossil fuel
- (d) derived from radioactive elements compression and bending

10 Which of the following shows a correct energy transfer pathway among some living organisms?

- (a) Hawk → Mouse → Grasshopper → Grass.
- (b) Grass → Grasshopper → Hawk → Frog.
- (c) Mouse → Grasshopper → Frog → Snake.
- (d) Grass → Grasshopper → Frog → Hawk.

- 11** The main property that makes titanium the ideal element for bone and artificial joint implants is
- (a) its ability to deliver drugs directly to cells
 - (b) its low extraction cost compared to other minerals
 - (c) its extreme softness and very light weight
 - (d) its ability to integrate with body tissues without being rejected by the immune system

- 12** Which of the following choices in the table represents the correct numbers of sodium and potassium ions exchanged through the sodium-potassium pump and the number of ATP molecules required for this exchange?

	The number of sodium ions that exit from the cell	The number of potassium ions that enter the cell	The number of ATP molecules consumed
(a)	22	66	42
(b)	44	22	66
(c)	66	44	22
(d)	44	66	22

- 13** What helps veins to return blood to the heart against gravity?
- (a) The presence of valves.
 - (b) Elasticity of walls.
 - (c) Lumen dilation.
 - (d) The type of blood flowing through them.

- 14** Some lipids such as cholesterol are involved in the formation of
- (a) plant cell walls
 - (b) some hormones and vitamin D
 - (c) nails and hair
 - (d) muscle fibers

- 15** In oil traps, the vertical arrangement of materials from top to bottom is
- (a) Oil → Gas → Water
 - (b) Water → Oil → Gas
 - (c) Gas → Oil → Water
 - (d) Oil → Water → Gas

- 16** The dissolution of carbon dioxide gas in rainwater results in the formation of
- (a) H_2CO_3
 - (b) CaCO_3
 - (c) HCO_3^-
 - (d) $\text{Ca}(\text{HCO}_3)_2$

17 Which of the following illustrates the correct sequence of the energy production pathway in the plant cell?

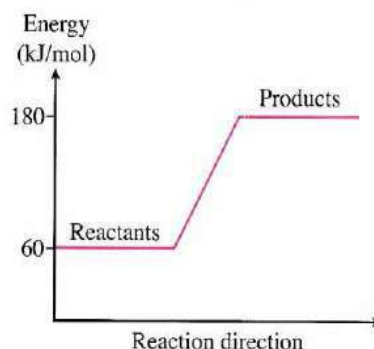
- (a) Glucose $\longrightarrow$ Glycogen $\longrightarrow$ Glucose $\longrightarrow$ ATP $\longrightarrow$ Energy.
- (b) Glucose $\longrightarrow$ Starch $\longrightarrow$ Glucose $\longrightarrow$ ATP $\longrightarrow$ Energy.
- (c) Energy $\longrightarrow$ Glucose $\longrightarrow$ ADP $\longrightarrow$ Energy $\longrightarrow$ Glucose.
- (d) Glucose $\longrightarrow$ Energy $\longrightarrow$ ADP $\longrightarrow$ Energy $\longrightarrow$ ATP.

18 Marble used in buildings is considered an example of

- (a) volcanic rocks
- (b) sedimentary rocks
- (c) igneous rocks
- (d) metamorphic rocks

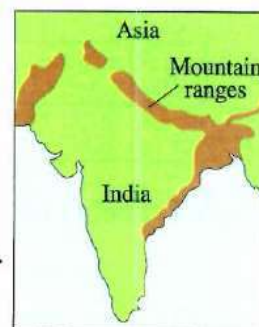
19 In the opposite graph, what is the value of change in the heat content during the occurred reaction?

- (a) +120 kJ/mol
- (b) -120 kJ/mol
- (c) +240 kJ/mol
- (d) -240 kJ/mol



20 From the opposite map, what is the type of tectonic plates movement that led to the formation of these mountains?

- (a) Divergent movement between two oceanic plates.
- (b) Convergent movement between two continental plates.
- (c) Divergent movement between a continental plate and an oceanic plate.
- (d) Transform movement between two continental plates.



Answer the following questions (21 : 23):

21 Mention some properties that change in a material when it is reduced to the nanoscale.

"Two properties are enough"

.....

.....

22 What is the role of biopolymers secreted by bacteria in oil extraction process?

.....

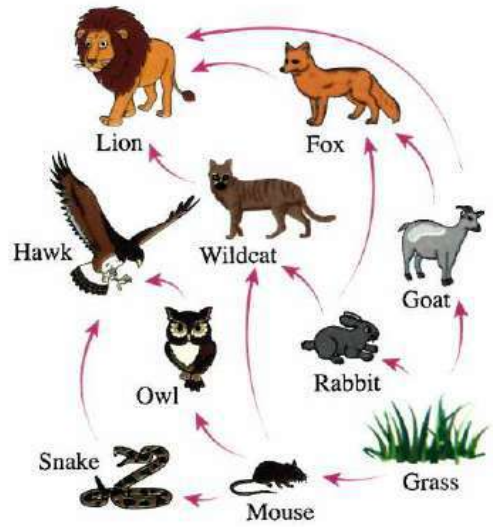
23 Compare between: filtration and reabsorption processes in the kidney for urine extraction, "in terms of: the concept".

.....

.....

Exam 5 ? Answered

Choose the correct answer (1 : 20):

- 1** Crude oil is heated in special furnaces before entering the distillation tower to a temperature of
 (a) 100°C (b) 250°C (c) 400°C (d) 1000°C
- 2** One molecule of ATP in the sodium-potassium pump that is found in the nerve cell membrane acts on
 (a) the exit of 3 Na⁺ against the entry of 2 K⁺
 (b) the exit of 2 Na⁺ against the entry of 3 K⁺
 (c) the entry of 3 Na⁺ against the exit of 2 K⁺
 (d) the entry of 2 Na⁺ against the exit of 3 K⁺
- 3** Minerals contribute to maintaining the stability of Earth through
 (a) regulating global climate
 (b) supporting the rock cycle and tectonic plates movement
 (c) providing energy required for volcanoes and earthquakes
 (d) determining the paths of rivers and oceans
- 4** The opposite figure illustrates a food web, which of the following organisms receives 0.1% of the energy stored in grass?
 (a) Snake.
 (b) Wildcat.
 (c) Owl.
 (d) Hawk.
- 
- 5** Atoms of the same element that have the same atomic number but differ in mass number are called
 (a) ions (b) molecules (c) isotopes (d) compounds
- 6** Cellular respiration begins with the breakdown of the glucose molecule in the
 (a) nucleus (b) mitochondria
 (c) cytoplasm (d) plasma membrane

- 7 Which choice in the following table results in the lowest amount of urine production in a healthy person?

	The activity exerted by the body	Temperature surrounding the body
(a)	Low	Low
(b)	High	Low
(c)	Low	High
(d)	High	High

- 8 The relationship between the biosphere and the lithosphere is clearly demonstrated through the process of

- (a) respiration of living organisms
- (b) absorption of mineral salts from soil by plants
- (c) evaporation of water from plant leaves
- (d) absorption of carbon dioxide gas by plants

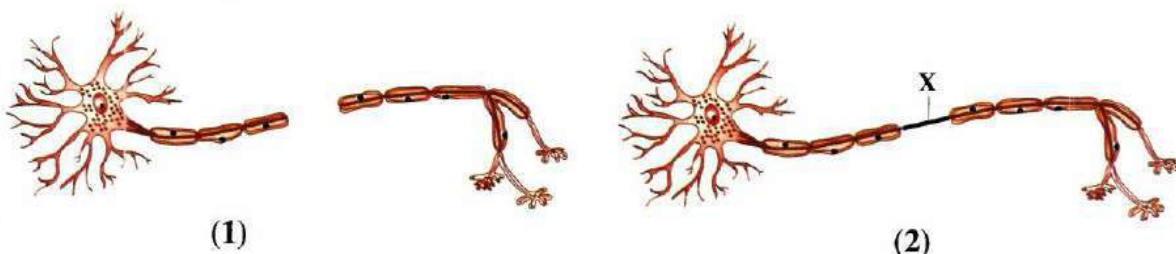
- 9 Car sensors and safety systems are considered an application for the use of

- (a) Compressed Air Energy Storing (CAES)
- (b) geothermal energy
- (c) piezoelectricity
- (d) nuclear energy

- 10 The main forces that arise in the leaves and act to pull the water column upward through the xylem vessels in tall plants are

- (a) adhesion forces with vessel walls
- (b) cohesion forces between water molecules
- (c) transpiration pull
- (d) net forces of the previous forces

- 11 The following figure shows a nerve cell before and after being treated with the nanomaterial (X):



Which of the following is correct?

- (a) In state (1), the cell cannot receive the nerve signal.
- (b) In state (1), the cell can transmit the nerve signal to another cell.
- (c) In state (2), the material (X) allows the nerve impulse to pass in opposite directions.
- (d) In state (2), the material (X) allows the nerve impulse to pass in only one direction.

12 In the food chain: Grass → Grasshopper → Frog → Snake → Eagle

If the energy stored in grass equals 20000 J, how much energy is lost when moving from the fourth trophic level to the fifth trophic level?

- (a) 2000 J. (b) 1998 J. (c) 20 J. (d) 18 J.

13 What is the relation between minerals and rocks in lithosphere?

- (a) Rocks are decomposed parts of minerals.
 (b) Rocks and minerals are different terms for the same thing.
 (c) Rocks are composed of minerals bonded together.
 (d) Minerals are composed of small rock particles.

14 The heart chamber that receives oxygen-rich blood coming from the lungs is

- (a) left atrium (b) right ventricle (c) left ventricle (d) right atrium

15 Which of the following wastes is/are eliminated through lungs?

- (a) Excess salts. (b) Urea.
 (c) Carbon dioxide. (d) Bilirubin.

16 Oxidation of 1g of lipids produces an amount of energy that is the energy produced by the same mass of carbohydrates.

- (a) equal to (b) less than
 (c) approximately twice (d) approximately three times

17 Strong steel casings (pipes) are used inside the well during drilling for oil extraction to

- (a) heat the oil
 (b) prevent leaks and ensure the well stability
 (c) cooling the drilling machines
 (d) convert oil to gas

18 Which of the following elements is its cycle in nature the most dependent on weathering and geological movements?

- (a) Carbon. (b) Nitrogen. (c) Phosphorus. (d) Oxygen.

19 Iron is used in some fields that contribute to reducing carbon emissions, including the manufacture of

- (a) inefficient internal combustion engines
- (b) fractional distillation tower structures
- (c) metallic structures of cars powered by fossil fuels
- (d) structures of high-speed trains and electric cars

20 Which of the following nanomaterials is/are classified as zero-dimensional nanomaterials?

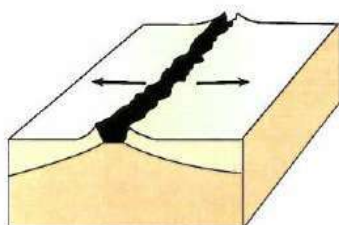
- (a) Quantum dots.
- (b) Graphene.
- (c) Carbon nanotubes.
- (d) Porous materials.

Answer the following questions (21 : 23):

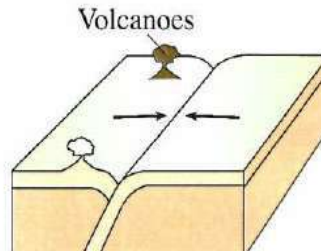
21 What is the normal value of systolic and diastolic blood pressure for a healthy person?

.....

22 The following figures show different types of tectonic plates movement:



(A)



(B)

(a) What is the type of the tectonic movement that is shown in figure (B)?

.....
.....

(b) What results from the tectonic movement in figure (A)?

.....
.....

23 Where are neurotransmitters stored before being released to transmit the nerve signal?

.....
.....

Exam 6 ? Answered

Choose the correct answer (1 : 20):

- 1 From the following equation, what do letters (X) and (Y) represent respectively?

$$X + 2\text{CO}_2 + 3\text{H}_2\text{O} \longrightarrow Y + \text{H}_4\text{SiO}_4$$
 - (a) (X) Calcium carbonate, (Y) Calcium bicarbonate.
 - (b) (X) Calcium pyroxene, (Y) Calcium bicarbonate.
 - (c) (X) Calcium carbonate, (Y) Calcium pyroxene.
 - (d) (X) Carbonic acid, (Y) Calcium bicarbonate.

- 2 Which of the following excretory substances are most toxic when accumulated in the body?
 - (a) Urea and water.
 - (b) Urea and mineral salts.
 - (c) Carbon dioxide and water.
 - (d) Ammonia and carbon dioxide.

- 3 What is the most abundant mineral group in the Earth's crust?
 - (a) Sulphides.
 - (b) Silicates.
 - (c) Oxides.
 - (d) Carbonates.

- 4 Which of the following reactions is an example of endothermic reactions?
 - (a) Anaerobic cellular respiration.
 - (b) Aerobic cellular respiration.
 - (c) Reaction of HCl with NaOH.
 - (d) Decomposition of potassium chlorate.

- 5 How does a yellow gold particle differ from a red gold particle?
 - (a) Its active surface area is larger.
 - (b) It has a greater surface area-to-volume ratio.
 - (c) It has a smaller surface area-to-volume ratio.
 - (d) Its dimensions are closer to the wavelength associated with electron.

- 6 The most common isotope of uranium in nature is
 - (a) U-234
 - (b) U-235
 - (c) U-238
 - (d) U-239

- 7 In a river ecosystem, which organisms in the food chain represent the primary consumers?
 - (a) Microscopic algae.
 - (b) Small fish.
 - (c) Large fish.
 - (d) Aquatic birds.

- 8 Atmospheric nitrogen is converted into absorbable compounds through
 - (a) fixation by nodular bacteria
 - (b) animal respiration
 - (c) photosynthesis
 - (d) forest fires

9 Which of the following minerals can be split into thin sheets, as shown in the opposite figure?

- (a) Mica.
- (b) Quartz.
- (c) Feldspar.
- (d) Galena.



10 In the synaptic region, the cell membrane returns to the resting state when

- (a) sodium channels open in the postsynaptic membrane
- (b) calcium channels close in the terminal button
- (c) acetylcholine diffuses in the synaptic cleft
- (d) acetylcholine is broken down by specific enzymes

11 Which of the following is a function of transpiration in plants?

- (a) Production of glucose and amino acids.
- (b) Contribution to the phosphorus cycle in nature.
- (c) Assistance in transporting nutrients through the phloem tissue.
- (d) Regulation of plant temperature.

12 Natural hydrogen in deep rocks is formed when

- (a) fossil fuel burns
- (b) water reacts with iron in olivine
- (c) the remains of dead organisms buried underground decompose
- (d) groundwater in deep rocks freezes

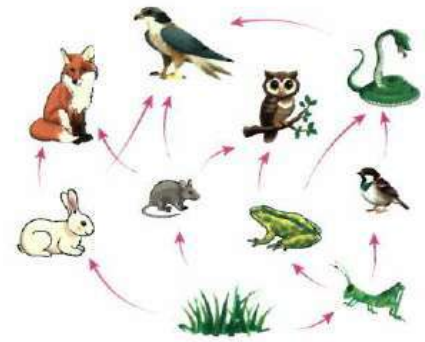
13 The continents protrude above sea level as a result of

- (a) lower density of sial rocks compared to sima rocks
- (b) higher density of sial rocks compared to sima rocks
- (c) decreasing the pressure exerted on the continental crust
- (d) the presence of silica in the Earth's crust

14 Infrared Thermography device monitors thermal equilibrium through

- (a) measuring the speed of blood flow to the skin
- (b) analyzing the rate of heat loss through the skin
- (c) measuring sweat gland activity in the skin
- (d) measuring urea concentration in sweat

- 15** The opposite figure shows a food web. If you know that the energy stored in grass equals 15000 J, so the amount of energy transferred to the fox is approximately



- (a) 150 J
- (b) 15 J
- (c) 1.5 J
- (d) 0.15 J

- 16** What causes a person to feel muscle fatigue after practicing strenuous exercise?

- (a) Accumulation of carbon dioxide in muscles.
- (b) Depletion of glucose in muscle cells.
- (c) Accumulation of lactic acid due to the anaerobic respiration.
- (d) Production of ethanol due to the anaerobic respiration.

- 17** When a large volume of air is pushed into a small cavity inside rocks, the pressure within the cavity

- (a) decreases
- (b) increases
- (c) remains constant
- (d) vanishes

- 18** What is the function of dendrites in a neuron?

- (a) Communicating with muscles and glands to give commands.
- (b) Containing the nucleus and essential organelles of the cell.
- (c) Receiving nerve signals from other cells.
- (d) Transmitting the nerve signal away from the cell body.

- 19** Extracting oil using microorganisms is considered a technique that is

- (a) traditional for oil extraction
- (b) highly energy-consuming
- (c) eco-friendly
- (d) used in high-productive wells

- 20** What is the importance of blood pressure in the body?

- (a) Helping to expel carbon dioxide through exhalation.
- (b) Ensuring continuous blood flow to all the cells and tissues.
- (c) Ensuring that the heart valves remain closed.
- (d) Maintaining a stable body temperature.

Answer the following questions (21 : 23):

- 21** Two samples of different minerals (A) and (B) have the same volume, with masses of 60 g and 75 g respectively and the mass of the same volume of water at a temperature 4°C is 10 g. **Calculate** the specific gravity of each mineral.
-
-

- 22** What happens when:

- (a) Several monosaccharide molecules are combined.
- (b) Proteins are broken down during digestion inside the human body.
-
-

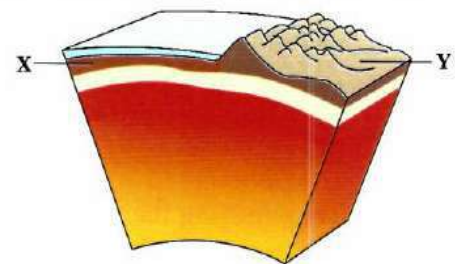
- 23** Give an example of three-dimensional nanomaterials.
-
-

Exam 7 ? Answered

Choose the correct answer (1 : 20):

- 1** The opposite figure shows a section in the Earth, which of the following represents rocks forming regions (X) and (Y)?

- (a) (X) Sima rocks / (Y) Sial rocks.
- (b) (X) Sial rocks / (Y) Sima rocks.
- (c) Both are sial rocks.
- (d) Both are sima rocks.



- 2** The reabsorption in kidney nephrons aims mainly to

- (a) get rid of the maximum possible amount of water
- (b) return beneficial substances like glucose and water back to blood
- (c) increase urea concentration in blood
- (d) get rid of excess salts from the body

- 3** The organisms located at the of the energy pyramid receive an amount of energy the organisms in the middle of the pyramid.

- (a) top – less than
- (b) bottom – less than
- (c) top – more than
- (d) bottom – equal to

4 The oil accumulation underground within rock layers surrounded by dome-shaped impermeable layers is called

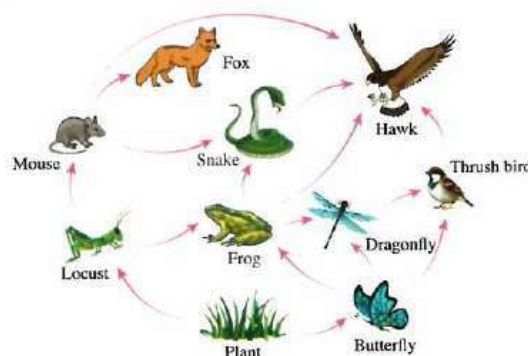
- (a) source rocks (b) oil traps
(c) rock caverns (d) oil refineries

5 What are the results of developing a nanomedicine for cancer treatment?

- (a) Destroying cancerous cells without harming healthy cells.
(b) Healthy cells engulf cancerous cells.
(c) Cancerous cells proliferate at a higher rate than healthy cells.
(d) Healthy cells proliferate at a higher rate than cancerous cells.

6 The opposite figure shows a food web. Which of the following organisms obtains the greatest amount of energy within this web?

- (a) Butterfly.
(b) Fox.
(c) Mouse.
(d) Frog.



7 The atomic number of an element atom is denoted by

- (a) A (b) Z (c) N (d) X

8 What happens to the rate of sweat secretion in winter?

- (a) It stops. (b) It increases.
(c) It decreases. (d) It is not affected.

9 What is the main function of phloem tissue in plants?

- (a) Transporting the products of photosynthesis from leaves.
(b) Maintaining the plant shape.
(c) Absorbing water and salts from the soil.
(d) Providing stem with strength and stiffness.

10 Which of the following could be used to scratch the statue of Ramesses II?

- (a) A piece of quartz. (b) A piece of metal coin.
(c) Fingernail. (d) A piece of gypsum.

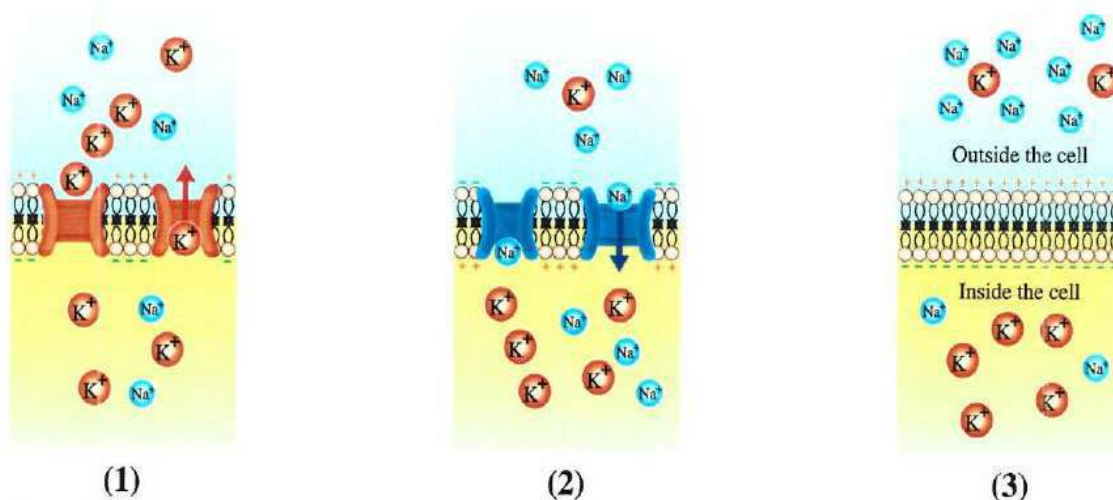
11 The level that includes all biomes on Earth's surface is the

- (a) ecosystem (b) biosphere (c) community (d) population

12 Some oil refineries rely on thermal and hydrocracking processes to convert

- (a) gases into liquids (b) heavy hydrocarbons into light benzene
(c) benzene into lubricating oil (d) petroleum into natural gas

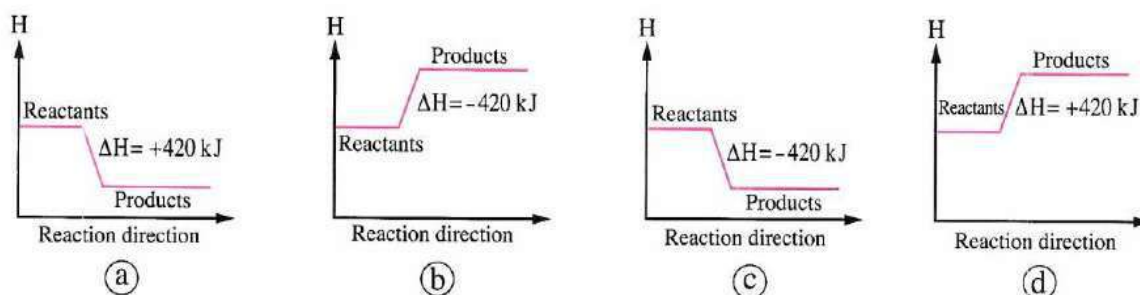
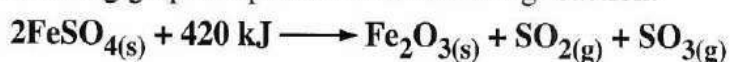
- 13** The following figures illustrate some of the changes occurring in part of the nerve cell membrane during the passage of nerve impulse:



What is the correct order of these figures starting from the resting state?

- (a) (1) $\longrightarrow$ (3) $\longrightarrow$ (2). (b) (3) $\longrightarrow$ (2) $\longrightarrow$ (1).
(c) (2) $\longrightarrow$ (1) $\longrightarrow$ (3). (d) (3) $\longrightarrow$ (1) $\longrightarrow$ (2).

- 14** Which of the following graphs represents the following reaction:



- 15** Lithosphere is composed of
(a) asthenosphere and lower mantle (b) upper mantle and lower mantle
(c) Earth's crust and lower mantle
(d) Earth's crust and the upper part of the upper mantle

- 16** Which of the following sugars is called "fruit sugar"?
(a) Glucose. (b) Fructose. (c) Sucrose. (d) Lactose.

- 17** Why do some minerals such as feldspar and quartz remain in soil without decomposition for long periods?
(a) Because they are resistant to dissolution in weak acids.
(b) Because they react with weak acids to form a protective layer.
(c) Because they are heavier than other minerals.
(d) Because they dissolve and crystallize continuously.

18 When performing strenuous exercise in hot weather, what causes the body to excrete less amount of urine?

- (a) Failure of kidney nephrons to perform filtration.
- (b) Loss of large amounts of water through sweating.
- (c) Failure of kidney nephrons to perform reabsorption.
- (d) Storage of urine inside the bladder.

19 In the fractional distillation tower, diesel and kerosene condense at

- (a) the top of the tower
- (b) the middle of the tower
- (c) the bottom of the tower
- (d) the bottom and the top of the tower

20 What is the main function of cellular respiration?

- (a) Releasing the chemical energy from glucose and storing it in a usable form.
- (b) Storage of chemical energy in the bonds of the atoms forming glucose.
- (c) Production of glucose as a direct source of energy.
- (d) Converting ATP molecules into ADP molecules to release energy.

Answer the following questions (21 : 24):

21 Mention two factors that affect the blood pressure inside arteries and **explain that**.

.....

.....

22 Mention some properties of zero-dimensional nanomaterials.

.....

.....

23 Mention one similarity and one difference between quartz and feldspar.

.....

.....

24 When a neurotransmitter binds to its specific receptors at the postsynaptic membrane, certain changes occur. **Explain**.

.....

.....

Choose the correct answer (1 : 20):

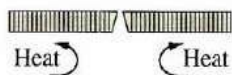
1 Which of the following polysaccharides are found in bodies of some animals?

- (a) Cellulose and glycogen. (b) Glycogen and chitin.
(c) Cellulose and starch. (d) Starch and chitin.

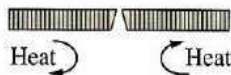
2 The main purpose of injecting water into deep rock fissures is

- (a) fragmentation of hard rocks (b) cleaning rocks from deposits
(c) gaining extreme heat from rocks (d) storing groundwater for drinking

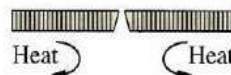
3 Which of the following figures shows the direction of convection currents that form new ocean floor?



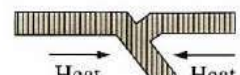
(a)



(b)



(c)



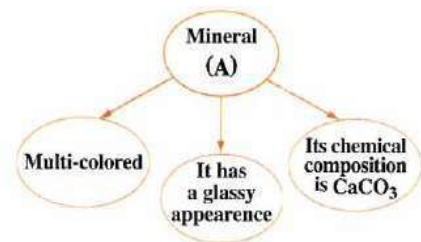
(d)

4 What is the role of the aorta in systemic circulation?

- (a) Allowing the exchange of gases and nutrients with cells.
(b) Transporting oxygenated blood from the heart to the parts of the body.
(c) Returning deoxygenated blood to the heart at low pressure.
(d) Supplying red blood cells with oxygen.

5 From the opposite diagram, which rock is formed from mineral (A)?

- (a) Granite.
(b) Quartz.
(c) Calcite.
(d) Limestone.



6 Which of the following primarily contribute to maintaining mineral ion balance in the body?

- (a) Lungs. (b) Kidneys.
(c) Liver and lungs. (d) Liver and kidneys.

7 Convection currents spread in

- (a) Earth's crust (b) asthenosphere (c) lower mantle (d) inner core

- 8** Complex food webs are more resilient to environmental changes because
- (a) they depend on a single source of food
 - (b) they contain multiple alternative food sources
 - (c) they include a limited number of producers
 - (d) they don't contain decomposers
-
- 9** The imbalance in the distribution of the electrical charges in the structure of a piezoelectric material occurs due to
- (a) the divergence of the material's molecules when melted
 - (b) the breakdown of chemical bonds between atoms of the material
 - (c) an increase in the surface area of the material when fragmented
 - (d) the deformation of the crystal structure of the material when pressed
-
- 10** Which of the following substances are from the products of complete aerobic cellular respiration in mitochondria?
- (a) Ethanol and carbon dioxide.
 - (b) Lactic acid and ATP molecules.
 - (c) Carbon dioxide, water and 34 ATP molecules.
 - (d) Glucose and oxygen.
-
- 11** During the process of bio-enhanced oil recovery, the bio-acids that are secreted by bacteria in oil wells help to
- (a) freeze oil to facilitate its transport
 - (b) increase the viscosity of crude oil
 - (c) dissolve some minerals that impede the petroleum flow
 - (d) reduce the volume of natural gas
-
- 12** In which does the bio-artificial kidney differ from the natural kidney?
- (a) Its reliance on cell engineering.
 - (b) Its ability to reabsorb glucose.
 - (c) Its ability to filter water.
 - (d) Its operation inside the human body.
-
- 13** When a neuron receives a sufficient stimulus, the depolarization state begins with
- (a) opening sodium channels to allow rapid inflow of Na^+ into the cell
 - (b) the entry of negative chloride ions to the cell to increase the negative potential difference
 - (c) the closure of sodium channels to prevent Na^+ from entering the cell
 - (d) opening potassium channels to allow K^+ to exit from the cell
-

- 14** Which of the following is a characteristic of the energy pyramid in a balanced ecosystem?
- (a) Higher levels obtain the greatest amount of energy.
 - (b) Organisms at each trophic level lose energy in the form of heat.
 - (c) Organisms lose 10% of energy when transferring from one level to another.
 - (d) Producers obtain less energy than consumers.

- 15** Why does powdered sugar dissolve faster than a single piece of sugar of the same mass in an equal amount of water?
- (a) Because the volume of sugar became less.
 - (b) Because the number of sugar molecules decreased.
 - (c) Because the surface area of the sugar exposed to the reaction increased.
 - (d) Because the sugar piece is broken down.

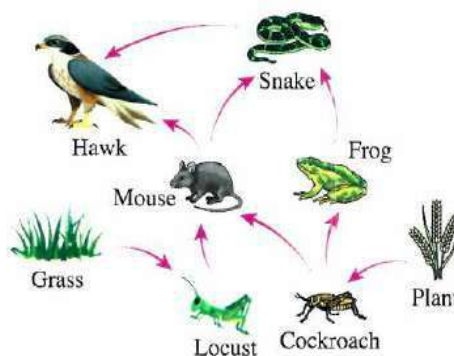
- 16** If the heat change for the combustion reaction of 2 moles of methanol (CH_3OH) is -726.5 kJ , what is the amount of heat released when only 1 mole of methanol is combusted?
- (a) -726.5 kJ (b) -1453 kJ (c) -363.25 kJ (d) $+363.25 \text{ kJ}$

- 17** Resins and synthetic fibers derived from petrochemicals are used in the manufacture of
- (a) jet fuel (b) electronic devices (c) road paving (d) ship fuel

- 18** The process that withdraws CO_2 gas from the atmosphere is
- (a) respiration (b) photosynthesis
(c) combustion (d) decomposition

- 19** The main goal of the high-speed electric train network project in Egypt is
- (a) reducing traffic congestion within the capital
(b) completely replacing the old railway network
(c) providing a fast means of transport to connect the cities of southern Egypt with the capital
(d) connecting production areas with export ports to support the economy

- 20** From the opposite food web, which of the following living organisms is considered both prey and predator at the same time?
- (a) Cockroach.
(b) Locust.
(c) Frog.
(d) Hawk.



Answer the following questions (21 : 24):

21 What happens when: a chemical reaction occurs "in terms of: energy"?

.....

.....

22 What is meant by nanotechnology?

.....

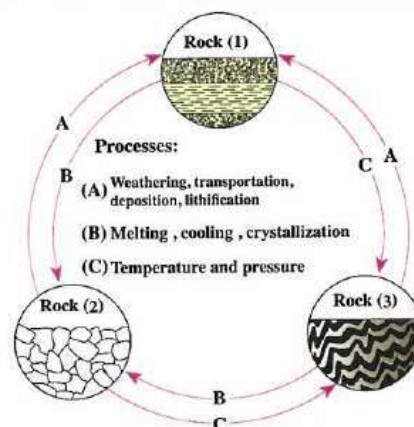
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23 The opposite diagram represents the processes that occur in the rock cycle. **Identify** the types of rocks (1), (2) and (3) respectively.

.....

.....

.....



24 What are the types of nerve cells inside the human body?

.....

.....

Exam 9 ? Answered

Choose the correct answer (1 : 20):

1 Proteins are composed of building units called

- (a) nucleic acids (b) amino acids (c) nucleotides (d) monosaccharides

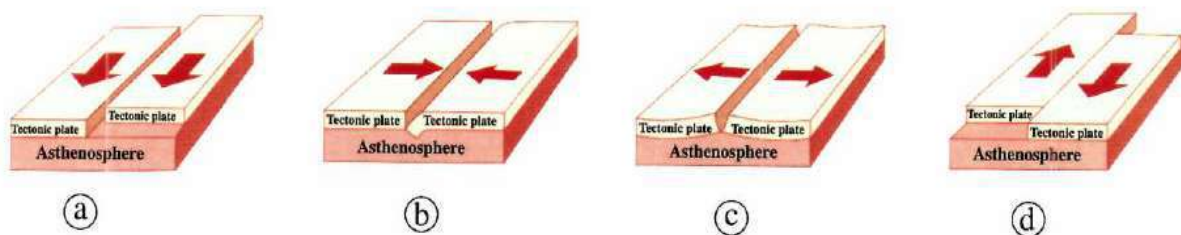
2 The correct order of the following tools from the lowest to the highest hardness is

- (a) a piece of metal coin → fingernail → iron nail
- (b) fingernail → a piece of metal coin → iron nail
- (c) fingernail → iron nail → a piece of metal coin
- (d) iron nail → a piece of metal coin → fingernail

3 Which of the following is/are from the components of phloem tissue and contain (s) a nucleus?

- (a) Sieve tube. (b) Tracheids. (c) Sieve plate. (d) Companion cell.

- 4 Which of the following models represents the direction of tectonic plates movement in the San Andreas fault region?



- 5 Bile juice in liver helps to eliminate water-insoluble wastes such as
 (a) ammonia (b) urea (c) excess cholesterol (d) excess salts
- 6 The electron microscope reveals very fine structures that cannot be seen by the light microscope, such as
 (a) cell nucleus (b) plasma membrane proteins and lipids
 (c) plant cell wall (d) cytoplasm
- 7 The increase in the temperature as we move towards the Earth's interior is called
 (a) thermal equilibrium (b) thermal pollution
 (c) global warming (d) thermal gradient
- 8 In which blood vessels does the exchange of oxygen, glucose, and wastes between blood and body cells occur?
 (a) Arteries. (b) Blood capillaries. (c) Pulmonary veins. (d) Venae cavae.
- 9 The rate of crude oil extraction mainly depends on a physical property of the crude, which is
 (a) color (b) boiling point (c) viscosity (d) freezing point
- 10 The food web in desert regions is characterized by
 (a) being very complex and interconnected
 (b) being simple and not complex
 (c) containing numerous numbers of producers
 (d) being unaffected by the loss of any species of living organisms
- 11 You have a material with dimensions (20 nm, 50 nm, 200 nm). This material is classified as
 (a) zero-dimensional nanomaterial (b) one-dimensional nanomaterial
 (c) two-dimensional nanomaterial (d) three-dimensional nanomaterial

12 Patients with high blood pressure who do not respond to blood pressure medications can be treated by

- (a) the inhibition of renal nerves around the kidney using ultrasound waves
- (b) the activation of renal nerves around the kidney using ultrasound waves
- (c) the repair of renal nerves around the kidney with nanobridges
- (d) the removal of renal nerves around the kidney surgically

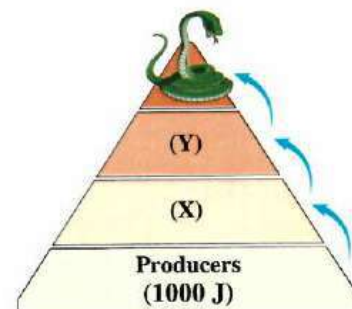
13 The liquid resulting from blood filtration in the kidney mainly contains

- (a) red blood cells and proteins
- (b) excess water, urea, and excess salts
- (c) glucose and proteins
- (d) amino acids and oxygen

14 One of the radioactive elements exists in lithosphere for nuclear energy production is

- (a) calcium
- (b) copper
- (c) uranium
- (d) aluminum

15 The opposite figure shows the energy transfer between trophic levels in an energy pyramid. Which of the following can represent the organisms indicated by (X)? And what is the amount of energy transferred to the organisms indicated by (Y) respectively?



- (a) Grass / 1000 J
- (b) Eagles / 10 J
- (c) Insects / 10 J
- (d) Rabbits / 100 J

16 The new mineral formed from the reaction of water molecules with iron in olivine inside rock fractures is

- (a) quartz
- (b) serpentine
- (c) gypsum
- (d) calcite

17 If you know that the hydrogen atom is the smallest known atom, which of the following represents its approximate radius?

- (a) 0.05 nm
- (b) 0.15 nm
- (c) 0.25 nm
- (d) 0.35 nm

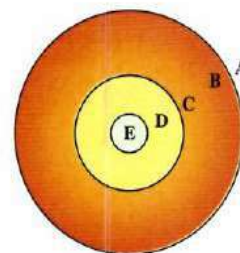
18 Phosphorus enters in the structure of the following biological molecules, except

- (a) DNA
- (b) ATP molecules
- (c) carbohydrates
- (d) RNA

19 The opposite figure represents different zones inside the Earth.

Which of the following zones have components that move in a continuous dynamic manner?

- (a) A (b) C
(c) D (d) E



20 Which of the following chemical equations represents a reaction in which the energy stored in the products is greater than the energy stored in the reactants?

- (a) $\text{C}_{(s)} + \text{O}_{2(g)} \longrightarrow \text{CO}_{2(g)} + \text{Heat}$
 (b) $2\text{KClO}_{3(s)} + \text{Heat} \longrightarrow 2\text{KCl}_{(s)} + 3\text{O}_{2(g)}$
 (c) $\text{H}_{2(g)} + \text{Cl}_{2(g)} \longrightarrow 2\text{HCl}_{(g)} + \text{Heat}$
 (d) $\text{HCl}_{(aq)} + \text{NaOH}_{(aq)} \longrightarrow \text{H}_2\text{O}_{(l)} + \text{NaCl}_{(aq)} + \text{Heat}$

Answer the following questions (21 & 22):

21 The opposite table shows properties of two types of minerals. Study it carefully and answer:

Property Mineral	Luster	Mineral group	Chemical composition
X	Glassy	Silicates	B
Z	Glassy	A	CaCO_3

- (a) What are minerals (X) and (Z)?
 (b) What do letters (A) and (B) indicate?

.....

22 How does the nervous system contribute to the stability of the biosphere?

.....

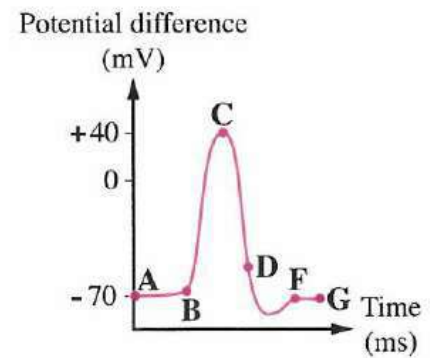
Exam 10 ? Answered

Choose the correct answer (1 : 20):

1 Reactions of aerobic respiration and fermentation are exothermic reactions, because they

- (a) occur only at high temperatures (b) produce energy
 (c) cause no energy change (d) require energy to occur

2 The opposite graph shows the changes experienced by a neuron exposed to a stimulus. During which stage would you expect that a new nerve impulse is generated, if another stronger stimulus affects the neuron?



- (a) From (A) to (B).
- (b) From (B) to (C).
- (c) From (C) to (D).
- (d) From (F) to (G).

3 If you know that the rate of a certain chemical reaction increased when using gold, this is due to using it in the form of

- (a) large blocks
- (b) flat flakes
- (c) nanoparticles
- (d) alloys

4 Which of the following meals leads to increasing the production of excess urea?

- (a) A meal rich in carbohydrates and fats.
- (b) A meal poor in carbohydrates and rich in proteins.
- (c) A meal rich in fats and poor in fibers.
- (d) A meal poor in fats and rich in fibers.

5 The opposite figure shows a porous volcanic rock that is used in



- (a) the manufacture of the batteries
- (b) the manufacture of the GPS navigation devices
- (c) enhancing the quality of drinking water
- (d) the manufacture of Magnetic Resonance Imaging (MRI) machines

6 In a marine ecosystem, which of the following organisms have the largest biomass?

- (a) Whales.
- (b) Large fish.
- (c) Small fish.
- (d) Aquatic algae.

7 The nerve impulse passing from nerve cell (X) to muscular cell (Y) is transmitted through

- (a) the dendrites of cell (X)
- (b) the nerve endings of cell (Y)
- (c) the interneurons
- (d) the synaptic region between the two neurons

- 8 The high specific gravity of galena is attributed to the presence of
(a) glassy appearance such as quartz
(b) elements such as calcium
(c) heavy elements such as lead
(d) the same components as feldspar
-
- 9 Which of the following are from the examples of monosaccharides?
(a) Glucose and sucrose. (b) Glucose and fructose.
(c) Sucrose and lactose. (d) Fructose and lactose.
-
- 10 The rocks in which hydrocarbons are found among their folds are called
(a) cap rocks (b) source rocks
(c) igneous rocks (d) metamorphic rocks
-
- 11 Adhesion forces contribute to water transport through the stem by
(a) binding water molecules together to form a continuous column
(b) helping to fix the water column inside xylem vessels
(c) generating the negative pressure that pulls water upward
(d) lowering water pressure in the stem compared to leaf cells
-
- 12 "Three-dimensional nanomaterials don't possess any nanoscale properties". How accurate is this statement?
(a) False, because they contain internal nanostructures.
(b) True, because they have large dimensions.
(c) True, because they can be seen with the naked eye.
(d) False, because they must be in the gaseous state.
-
- 13 Which of the following exists in the lithosphere and possesses piezoelectric properties?
(a) Magnesium. (b) Iron. (c) Quartz. (d) Calcite.
-
- 14 What is the main role of some types of bacteria and fungi in the ecosystem?
(a) Producing energy from the Sun.
(b) Providing food for the primary consumers.
(c) Recycling the soil mineral elements.
(d) Reducing the amount of carbon dioxide in the atmosphere.
-
- 15 Which of the following processes is not from the ways of minerals formation in the Earth's crust?
(a) Biological decomposition of organic substances.
(b) Rearrangement of mineral atoms due to pressure and heat.
(c) Precipitation of salts when water evaporates.
(d) Crystallization of magma upon cooling.
-

- 16** A massive energy is released from uranium atoms during the process of
 (a) nuclear meltdown (b) nuclear fission
 (c) nuclear fusion (d) nuclear combination
-
- 17** The skin layer that protects the body from microbes and water loss is
 (a) dermis (b) hypodermis (c) epidermis (d) fatty layer
-
- 18** Major deserts that share in harsh climatic characteristics and plants adapted to drought are known as
 (a) community (b) biome (c) population (d) biosphere
-
- 19** The substance that remains at the bottom of the fractional distillation tower is
 (a) benzene (b) kerosene (c) bitumen (d) naphtha
-
- 20** Using rocks that contain minerals with a clear cleavage is considered dangerous in building tunnel walls, because these minerals
 (a) react chemically with other building materials
 (b) change their color over time, affecting their aesthetics appearance
 (c) split or crumble into layers under mechanical pressure
 (d) make the walls less resistant to weathering
-

Answer the following questions (21 : 23):

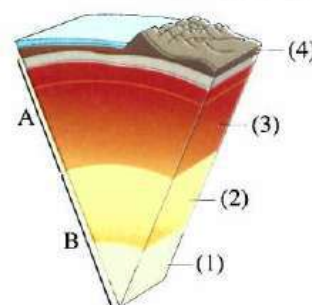
- 21** Calculate the ratio between the molar mass of a glucose molecule and the molar mass of a water molecule.
 (Knowing that: C = 12, O = 16, H = 1)

.....

- 22** The opposite figure shows a model of a section in the Earth. Study it well, then answer:

- (a) What is the chemical composition of layer (1)?
 (b) What is the physical state of layer (2)?

.....



- 23** Give reason for: Nutrient cycles play a fundamental role in the continuation of life on Earth.

.....

Answers of General Exams



Answers of Exam

1

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	b	c	c	b	b	b	d	d	c	c

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	b	c	d	b	a	c	b	b	c	d

21 : 23 Answer by yourself.

Answers of Exam

2

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	c	c	a	d	c	d	b	c	c	b

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	b	c	a	b	b	b	d	a	a	a

21 : 24 Answer by yourself.

Answers of Exam

3

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	b	c	b	d	b	b	d	c	b	b

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	a	b	d	c	b	d	a	c	a	b

21 : 23 Answer by yourself.

Answers of Exam

4

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	d	b	c	c	b	b	c	b	b	d

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	d	c	a	b	c	a	b	d	a	b

21 : 23 Answer by yourself.

Answers of Exam

5

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	c	a	b	d	c	c	d	b	c	c

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	d	d	c	a	c	c	b	c	d	a

21 : 23 Answer by yourself.

Answers of Exam

6

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	b	d	b	d	c	c	b	a	a	d

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	d	b	a	b	a	c	b	c	c	b

21 : 23 Answer by yourself.

Answers of Exam

7

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	a	b	a	b	a	a	b	c	a	a

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	b	b	b	d	d	b	a	b	b	a

21 : 24 Answer by yourself.

Answers of Exam

8

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	b	c	a	b	d	b	b	b	d	c

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	c	a	a	b	c	c	b	b	d	c

21 : 24 Answer by yourself.

Answers of Exam

9

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	b	b	d	d	c	b	d	b	c	b

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	b	a	b	c	c	b	a	c	c	b

21 & 22 Answer by yourself.

Answers of Exam

10

Question no.	1	2	3	4	5	6	7	8	9	10
Answer	b	d	c	b	c	d	d	c	b	b

Question no.	11	12	13	14	15	16	17	18	19	20
Answer	b	a	c	c	a	b	c	b	c	c

21 : 23 Answer by yourself.

كيفية طباعة صفحات معينة من ملف معين مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9

